

chart book

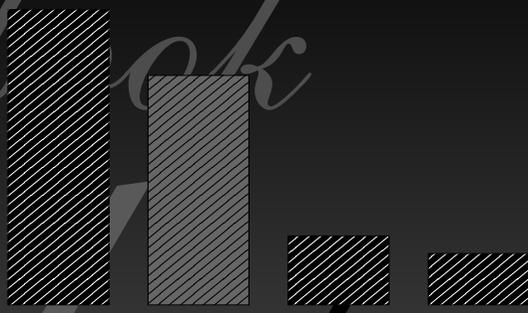


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MORBIDITY &
MORTALITY:
2004 CHART BOOK
ON CARDIOVASCULAR,
LUNG, AND BLOOD
DISEASES

MAY 2004

FOR ADMINISTRATIVE USE

*NATIONAL INSTITUTES
OF HEALTH*

*National Heart, Lung,
and Blood Institute*

U.S. DEPARTMENT OF HEALTH AND
HUMAN SERVICES

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Foreword

The mission of the National Heart, Lung, and Blood Institute (NHLBI) is to provide leadership and support for research in cardiovascular, lung, and blood diseases; sleep disorders; women's health; and blood resources. The ultimate goal is to improve the health and well-being of the American people. Although program priorities are determined primarily by research opportunities, other factors have an influence: the magnitude, distribution, and trends of cardiovascular, lung, and blood diseases in the United States, as well as the ability to improve the Nation's health; congressional mandates; the health needs of the Nation as perceived by Institute staff and outside advisory groups; and recommendations from the National Heart, Lung, and Blood Advisory Council, have a significant impact on establishing research priorities.

Evaluation of the Institute's program balance and program impact is a continuous process that relies on assessments of morbidity and mortality in the United States from cardiovascular, lung, and blood diseases. Consideration is given to their

distribution among the population; to their trends over time; and to related statistics on population risk factors, lifestyles, medical care, and economic impact.

This *Chart Book*, like its predecessors, provides information on the progress being made in the fight against cardiovascular, lung, and blood diseases. It serves as a resource for the Institute as it plans and prioritizes future activities.

I would like to express my appreciation to Mr. Thomas Thom of the NHLBI for his time and effort in developing the material presented in this *Chart Book*.



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1. Introduction

During the past 35 years, major advances have been made in the prevention, diagnosis, and treatment of cardiovascular, lung, and blood diseases. Death rates from cardiovascular diseases (CVD) have declined significantly and Americans are living longer, healthier lives. Yet, despite tremendous progress, morbidity and mortality from cardiovascular, lung, and blood diseases continue to impose an enormous burden on patients, their families, and the national health care system; the economic cost to the Nation is substantial.

This *Chart Book* describes the magnitude of the problem and contains time trends for cardiovascular, lung, and blood diseases, highlighting demographic differences—age, sex, and minority/ethnic status. Nationally collected data are presented by race and ethnicity to the extent they are available, statistically reliable, and consistently collected.

The “Background Data” chapter provides population and life-expectancy estimates, trends in total mortality, leading causes of death and activity limitation, prevalence of CVD risk factors, and economic cost data. It also includes trends in mortality by major diagnoses and trends in number of days of inpatient hospital care by major diagnoses. The “Cardiovascular Diseases,” “Lung Diseases,” and “Blood Diseases” chapters contain detailed morbidity and mortality statistics by race/ethnic group, sex, and geographic distribution. Diseases included under the three headings are listed in the first table in each chapter together with appropriate diagnostic codes of the 9th and 10th revisions of the International Classification of Diseases (ICD) of the World Health Organization (WHO).^{1–2}

Sources of Data

Most of the data used in this book were obtained from the National Center for Health Statistics (NCHS). They include annual vital statistics of the United States; the annual National Health Interview Survey (NHIS); the National Health and Nutrition Examination Survey (NHANES), 1971–75, 1976–80, 1988–94, and 1999–2000; the National Health Examination Survey, 1960–62; the annual National Hospital Discharge Survey; and the annual National Ambulatory Medical Care Survey. Population data came from the U.S.

Bureau of the Census and international mortality data came from the WHO Web site.

It is beyond the scope of the *Chart Book* to cite all of the NCHS and Bureau of the Census publications and Web sites that are used to prepare this document. Specific data sources for current statistics and general references to hospital and prevalence surveys and vital statistics for earlier data years may be found in the “References” appendix.

Population Estimates

The NCHS and the NHLBI use annual mid-year U.S. population estimates from the Bureau of the Census to express morbidity and mortality per population. Prevalence and hospital discharge statistics are based on noninstitutionalized population estimates that were included in NCHS publications. The annual live births, reported by NCHS, are used to calculate infant mortality rates.

Population estimates for 1991–98 were revised by the Bureau of the Census to take into account the 2000 Census.³ Population counts and estimates since the 2000 Census have been bridged to single race categories, combining multiple race categories.

Quality of Data

Quality issues discussed below include accuracy of diagnosis and data comparability in prevalence, hospitalization, and mortality statistics.

Prevalence

Diagnoses for most disease prevalence and smoking habits are based only on self reports from health interviews. Physical measurements are used to determine the prevalence of high serum cholesterol and overweight. Prevalence of hypertension is based on blood pressure readings and health interviews about relevant medication. For hospital, mortality, and economic cost statistics, the accepted diagnosis is the one listed on medical records, death certificates, or survey forms and is consistent with ICD codes.

Hospital Statistics

Hospital statistics measure rates of health care use, length of stay, and hospital case fatality. They have limitations associated with diagnostic accuracy (e.g., the diagnosis may be influenced by the billing process) and diagnostic comparability over time (e.g., ICD revisions). Time trends may not accurately reflect real changes in incidence and case-fatality because the data occasionally include changes in hospital admission practices.

The term *hospitalizations*, which replaces the National Hospital Discharge Survey term *hospital discharges*, refers to all inpatients, whether discharged alive or dead. The diagnosis given at discharge, and not at admission, is used. Most tabulations of hospitalizations are first-listed diagnoses on the hospital record (i.e., primary diagnosis). Some tabulations are of the “all-listed” diagnoses that include both primary and secondary diagnoses for a particular disease. Because the survey is event-based rather than patient-based, annual estimates pertain to numbers of hospitalizations, not to the number of patients hospitalized in a given year.

Methodological problems in data collection preclude the presentation of hospital data by race.⁴

Cause-of-Death Statistics

Limitations in cause-of-death statistics, apart from discontinuities over time due to revisions in the ICD, are well known. Inaccuracies in death certification and inconsistencies in selecting and coding the underlying cause of death create uncertainties as to the true magnitude of mortality from a specific cause compared with other causes. These uncertainties must also be kept in mind when comparing the same cause of death over time or between demographic groups or countries.

Selecting only one cause of death as the underlying cause has the advantage of diagnostic specificity, but the disadvantage of an incomplete accounting of the various causes that contributed to a death. Here, mortality statistics are limited to the underlying cause because the complexity of tabulating both the underlying and contributing (secondary) causes are beyond the scope of this book.

Updating population estimates for 1991–98 resulted in changes to the death rates for those years found in the 2002 *Chart Book*. Additionally, death rates for 1999 and 2000 were taken from the CDC Wonder or the NCHS Data Warehouse and, to date, have not been updated.^{5,6} This means that mortality time trends over the 1999–2002 period will have to be revised.

Another limitation related to cause-of-death statistics involves international comparisons of vital statistics. Comparisons of mortality data for coronary heart disease (CHD), stroke, and chronic obstructive pulmonary disease (COPD) among countries are affected by differences in diagnostic practices and physician training, interpretation of internationally recommended rules for coding a cause of death, availability of diagnostic aids, and the use of autopsies. Information presented in this book is limited to countries that are known to produce high-quality statistics.

Inconsistent race identification between death certificates and data from the Census Bureau and undercounts of some population groups in the Census cause over- and underestimation of death rates in racial groups.⁷

ICD Revisions

Revisions in the ICD (Appendix A) have affected the comparability of time trends, particularly those associated with mortality. Wherever this is a significant problem, breaks in trend lines have been added between revisions to alert the reader to this issue. To compensate for the differences in mortality classification between ICD/9 (1979–98) and ICD/10 (1999–) in selected charts (Charts 3–51, 3–52, 4–11), the NCHS-derived comparability ratios shown in Appendix B have been applied to the death rates coded by ICD/9.⁸

Data Presentation

Death rates are expressed per 100,000 population using the resident U.S. population as of July 1 of the relevant year as the denominator. Prevalence, on the other hand, is expressed as the percent of the population. Hospital discharge rates are per 10,000 population, and the number of discharges is the denominator for percent discharged dead. Infant mortality rates are expressed per 100,000 live births.

Age Adjustment

Age-adjusted rates are used to compare prevalence or mortality among various population groups or for one group over time. The 2000 standard population is applied in the age adjustment so that when comparisons are made, these rates are not affected by age composition differences among the populations.^{9–11} The European standard population is applied for age adjustment of international mortality statistics.¹²

The major disadvantage of using age-adjusted rates is loss of age-specific information. This becomes evident when the population groups being compared have mortality cross-over differences within a given age range. For example, the bar chart for mortality from diseases of the arteries (Chart 3–65) has similar age-adjusted rates for white and for black males. The age-specific line chart (Chart 3–66), however, shows that for ages 35 to 64, black males have higher rates compared to white males, but for ages 65 to 84, black males have lower rates compared with white males.

Percent Change

Percent changes in death rates over time, whether between 2 specified years or on an average annual basis, are calculated from log-linear regression slopes of rates for each year of a selected period.¹³ They may be influenced by unusually high or low values, especially if the period is short, and do not provide information about the levels on which they are based, which might be small. Average annual percent changes should not be summed over a period because the sum will be more than the percent change from the first to the last year in the period. Average annual percent changes give the appearance of small differences in the comparisons being made.

An exception to the use of log-linear regression to calculate percent change is made for Chart 3–6. For this table, it is useful to have the percent change and other calculations based on the actual death rates.

Horizontal and Vertical Scales

Comparisons between time-trend charts are complicated because ranges of the horizontal and vertical scales are not uniform and may be truncated. Vertical scales for less common diagnoses are magnified to focus on age, race, and sex differences.

Arithmetic and Logarithmic Scales

In this *Chart Book*, time trends in death rates are plotted on an arithmetic Y-scale to show their absolute change relative to zero. On an arithmetic scale, the absolute increase or decrease for a smaller death rate may appear to be modest compared with the change for a larger death rate, when in fact, the percent change over time is greater for the smaller rate. In addition, on an arithmetic scale, a decline can be slowing whereas the rate of decline, if plotted on a logarithmic scale, might not be slowing.

Truncated Age Ranges

The age range for death rates in some charts excludes groups of individuals older than 84 years because of the difficulty associated with obtaining accurate diagnoses for patients who often have other contributing comorbidities. Selected truncated age groups are frequently used for U.S. data to highlight specific premature adult morbidity and mortality. For international comparisons, 35–74 years was chosen so that differing age distributions among countries would be minimized in rate calculations.

Demographic Characteristics

The *Chart Book* provides prevalence and mortality information for various racial and ethnic groups. Several charts show comparisons between blacks and whites. However, for mortality prior to 1968, data for nonwhites instead of blacks are presented. Many charts provide a race/sex comparison. Others present data for total males and total females or for total whites and total blacks to highlight important points that otherwise would be lost if four-way combinations were used.

The term *American Indian* is used to refer to the population that consists of American Indians and Alaska Natives. The term *Asian* is used to include the population that consists of Americans of Asian and Pacific Islander descent. Data on socioeconomic groups are not presented because they are extensively presented elsewhere.¹⁴

State Mortality

Death rates for total population by State are shown in maps for CVD, CHD, stroke, and COPD.⁵ Although

State death rates that combine all age, race, and sex groups can be misleading, they show a reasonably similar geographic pattern compared with maps that are either race and sex specific or confined to a specific age range (not shown). This is true even for stroke mortality, in which high rates in Southern States are not due merely to the large black population. Although rankings of certain States for CHD mortality differ markedly from rankings for total heart disease, the two geographic patterns are not markedly different.¹⁵

2. Background Data

The charts in this chapter provide population estimates, life expectancy, morbidity and mortality information, and economic cost data for cardiovascular, lung, and blood diseases. Most of them focus on the leading causes of death, but a few show prevalence of specific CVD risk factors. Immediately below are selected prevalence and incidence estimates.

Cardiovascular Diseases

Table 2–1 contains 2001 prevalence estimates of the U.S. population with CVD. Individuals with multiple CVD are counted for each condition that applies to them.^{16–18}

CVD	64,400,000
Hypertension	50,000,000
CHD	13,200,000
Acute Myocardial Infarction (AMI)	7,800,000
Angina Pectoris	6,800,000
Stroke	4,800,000
Heart Failure	5,000,000
Congenital Heart Defects	1,000,000
Atrial Fibrillation	2,200,000

Table 2–2 contains 2001 estimates for the annual occurrence of CVD in the United States.^{19–22}

Heart Attack	1,200,000
First Event	700,000
Recurrent Event	500,000
Stroke	700,000
First Event	500,000
Recurrent Event	200,000
Heart Failure	550,000
First Event	550,000

Lung Diseases

In 2002, 11.2 million U.S. adults were estimated to have COPD, i.e., chronic bronchitis (9.1 million) or emphysema (3.1 million).²³ Approximately 20 million people have asthma, of whom 12 million people experienced at least one asthma attack in 2002.²³ Approximately 30,000 people have cystic fibrosis, and 2,500 new cases are reported annually. Respiratory distress syndrome occurs in 40,000 infants and 150,000 adults each year.

In this chapter, charts showing leading causes of death combine asthma with COPD and list the category as *COPD and allied conditions*. The ICD/10 term is *chronic lower respiratory diseases*.

Blood Diseases

An estimated 72,000 blacks have sickle cell anemia. The incidence is about 1 in 500 births. Approximately 20,000 persons have hemophilia, and 1,000 persons have Cooley’s anemia.

Population

Population estimates in Chart 2–1 are based on the 1990 U.S. Census and population surveys. Estimates in Chart 2–2 and Chart 2–3 are based on the 2000 U.S. Census and population projections. Designation of race and ethnicity in Chart 2–2 reflects the 1997 Office of Management and Budget directive on race and ethnicity that allows survey respondents in Federal data collection programs to select more than one race. In Chart 2–3, designations of race were modified by NCHS to be consistent with the directive.

Background Data

Chart 2–1
Total Population by Mean Age, Percent Ages 65 and Over,
Race/Ethnicity, and Sex, U.S., 2002

The mean age and percent population aged ≥ 65 are lower for minorities in the United States than for whites. This holds true for both males and females.²⁴

	Total Population			Male			Female		
	Pop. (Mil.)	Mean Age	Percent ≥ 65	Pop. (Mil.)	Mean Age	Percent ≥ 65	Pop. (Mil.)	Mean Age	Percent ≥ 65
Total	280.3	36.2	12.6	137.0	35.5	10.8	143.3	38.0	14.3
White	229.5	37.7	13.6	112.8	36.4	11.6	116.7	38.9	15.5
Hispanic	(31.7)	(29.3)	(6.2)	(15.9)	(28.5)	(5.2)	(7.9)	(30.1)	(13.5)
Non-Hispanic	(197.8)	(39.0)	(14.8)	(96.9)	(37.7)	(12.6)	(100.9)	(40.3)	(16.8)
Black	36.2	32.7	8.3	17.2	31.2	6.9	19.0	34.0	9.6
Hispanic	(1.9)	(29.4)	(5.7)	(1.0)	(28.6)	(4.7)	(1.0)	30.2	(6.6)
Non-Hispanic	(34.3)	(32.9)	(8.5)	(16.2)	(31.3)	(7.1)	(18.0)	(34.2)	(9.7)
Indian	2.5	31.0	7.1	1.2	30.2	6.0	1.3	31.8	8.0
Asian	12.0	33.2	7.8	5.8	32.2	6.9	6.3	34.2	8.7
Hispanic*	34.8	29.3	6.1	17.4	28.5	5.1	17.3	30.1	7.1

* Hispanic can be of any race.

Note: Estimates of numbers of Hispanic American Indians and Hispanic Asians are not provided separately.

Chart 2–2
Projected Population by Race and Hispanic
Origin, U.S., 2020–2050

By 2020, 17.8% of the U.S. population will be Hispanic, 13.5% black, 61.3% non-Hispanic white, and 16.3% will be aged ≥ 65 .²⁴

	2020		2030		2040		2050	
	Pop. (Mil.)	Percent Total						
Total	335.8	100.0	363.6	100.0	391.9	100.0	419.8	100.0
<i>(Aged ≥ 65)</i>	<i>(54.6)</i>	<i>(16.3)</i>	<i>(71.4)</i>	<i>(19.6)</i>	<i>(80.0)</i>	<i>(20.4)</i>	<i>(86.7)</i>	<i>(20.6)</i>
White*	260.6	77.6	275.7	75.8	289.7	73.9	302.6	72.1
Black*	45.4	13.5	50.4	13.9	66.9	14.3	61.4	14.6
Asian*	18.0	5.4	22.6	6.2	28.0	7.1	33.4	8.0
All other races	11.8	3.5	14.8	4.1	18.4	4.7	22.4	5.3
Hispanic (of any race)	(59.8)	(17.8)	(73.0)	(20.1)	(87.6)	(22.3)	(102.6)	(24.4)
Non-Hispanic White	(205.9)	(61.3)	(209.2)	(57.5)	(210.3)	(53.7)	(210.3)	(50.1)

* No other race, includes Hispanics.

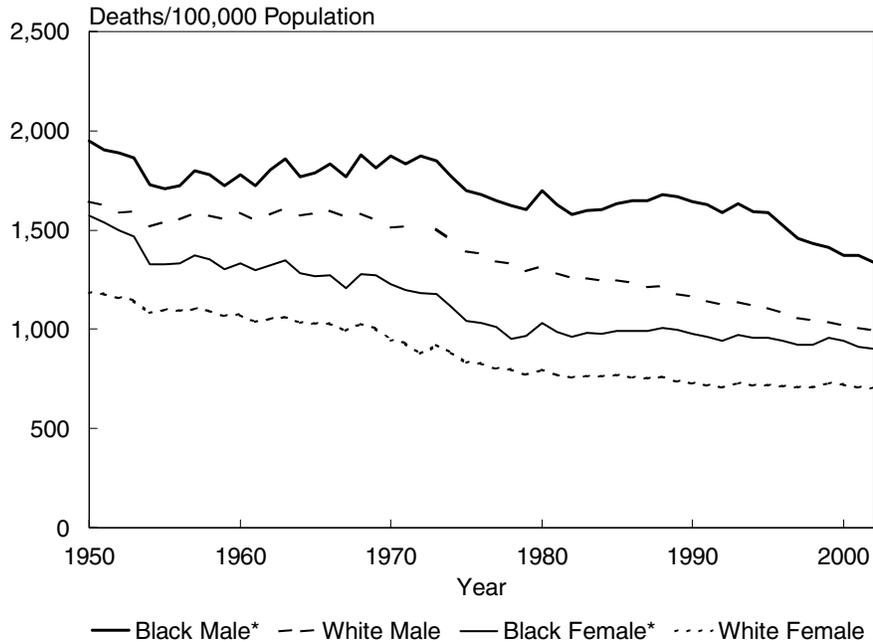
Chart 2–3
Average Remaining Lifetime Years
by Age, Race, and Sex, U.S., 2002

In 2002, average life expectancy at birth was 77.4 years—79.9 years for females compared with 74.7 years for males and 77.8 years for whites compared with 72.5 years for blacks.²⁵

Year	Total	Male	Female	Total White	White Male	White Female	Total Black	Black Male	Black Female
Birth	77.4	74.7	79.9	77.8	75.3	80.3	72.5	68.9	75.7
15	63.1	60.5	65.6	63.5	60.9	65.9	58.8	55.3	61.9
35	44.1	41.8	46.2	44.4	42.1	46.5	40.2	37.3	42.8
65	18.2	16.6	19.5	18.2	16.6	19.5	16.6	14.6	18.0
75	11.6	10.4	12.5	11.6	10.4	12.4	11.0	9.5	11.9

Background Data

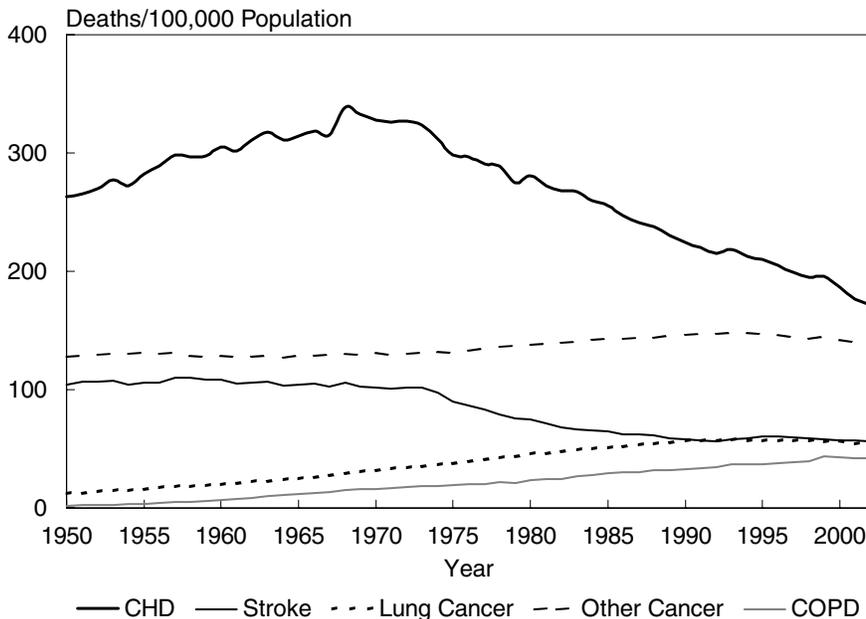
Chart 2-4
Age-Adjusted Death Rates for All Causes
by Race and Sex, U.S., 1950-2002



* Nonwhite from 1950-1967.

Between 1950 and 2002, the all-cause death rate declined for blacks and whites and for males and females. It remained higher in males than in females. Within sex groups, the rate was higher in blacks than in whites.^{5, 25, 26}

Chart 2-5
Crude Death Rates for Selected Causes,
U.S., 1950-2002



Between 1950 and the late 1960s, the CHD rate increased and the stroke death rate declined modestly. From about 1968 to 2002, the rate for both diseases declined steeply. In contrast, the death rates for COPD and lung cancer increased over most of the 1950 to 2002 period.^{5-6, 25-26}

Background Data

Chart 2-6
Number of Days of Inpatient Hospital Care
by Major Diagnosis, U.S., 1989-2002

Between 1989 and 2002, cardiovascular and respiratory diseases ranked first and second, respectively, in the number of days for which inpatients received hospital care.²⁷

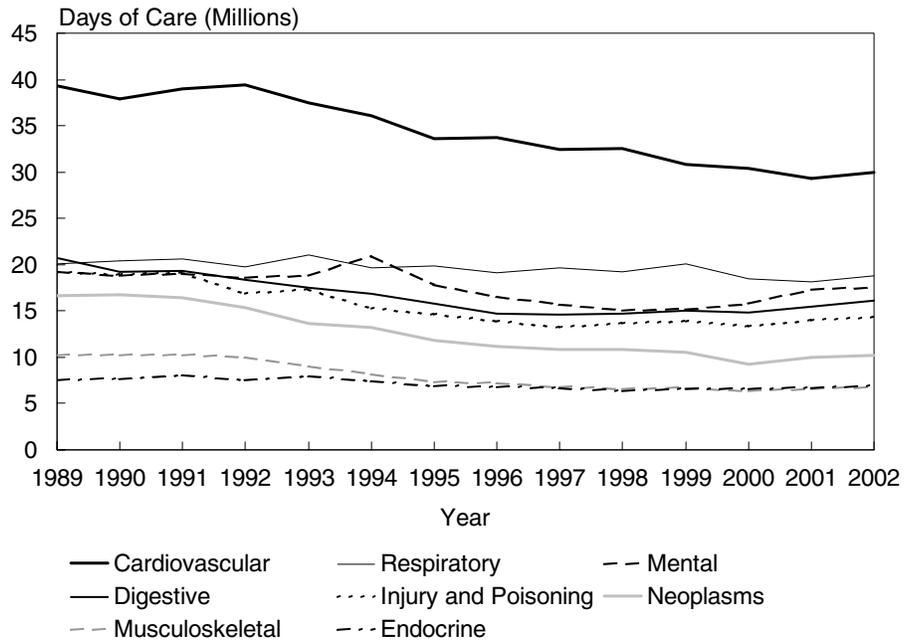
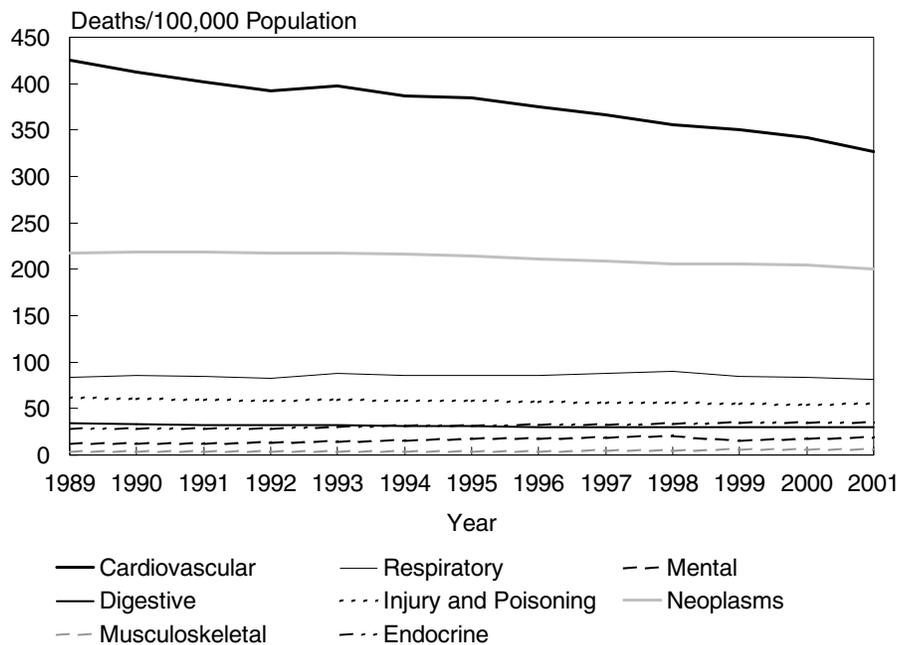


Chart 2-7
Age-Adjusted Death Rates
by Major Diagnosis, U.S., 1989-2001

Between 1989 and 2001, age-adjusted death rates for cardiovascular and respiratory diseases ranked first and third, respectively.⁵



Background Data

Chart 2–8
Leading Causes of Death,
U.S., 2002

Cause of Death	Number
Total Deaths	2,447,862
Heart disease*	695,754
Cancer	558,847
Cerebrovascular disease (stroke)	163,010
COPD and allied conditions†	125,500
Accidents	102,303
Diabetes	73,119
Influenza and pneumonia	65,984
Alzheimer's disease	58,785
Nephritis	41,018
Septicemia	33,881
All other causes of death	529,661

* Includes 493,542 deaths from coronary heart disease.

† Chronic lower respiratory diseases.

In 2002, heart disease, stroke, and COPD and allied conditions were the first, third, and fourth leading causes of death, respectively.²⁵

Chart 2–9
Leading Causes of Death
by Age and Rank, U.S., 2002

Cause of Death	1–24	25–44	45–64	≥65
Heart disease	6	3	2	1
Cancer	4	2	1	2
Cerebrovascular disease	—	8	4	3
Accidents	1	1	3	9
COPD and allied conditions*	7	—	6	4
Influenza and pneumonia	8	10	—	6
Diabetes mellitus	—	9	5	5
Suicide	3	4	8	—
Chronic liver disease	—	7	7	—
Nephritis and nephrosis	—	—	—	8
Homicide	2	6	—	—
Septicemia	9	—	10	10
HIV infection	—	5	9	—
Congenital anomalies	5	—	—	—
Alzheimer's disease	—	—	—	7
Benign neoplasms	10	—	—	—

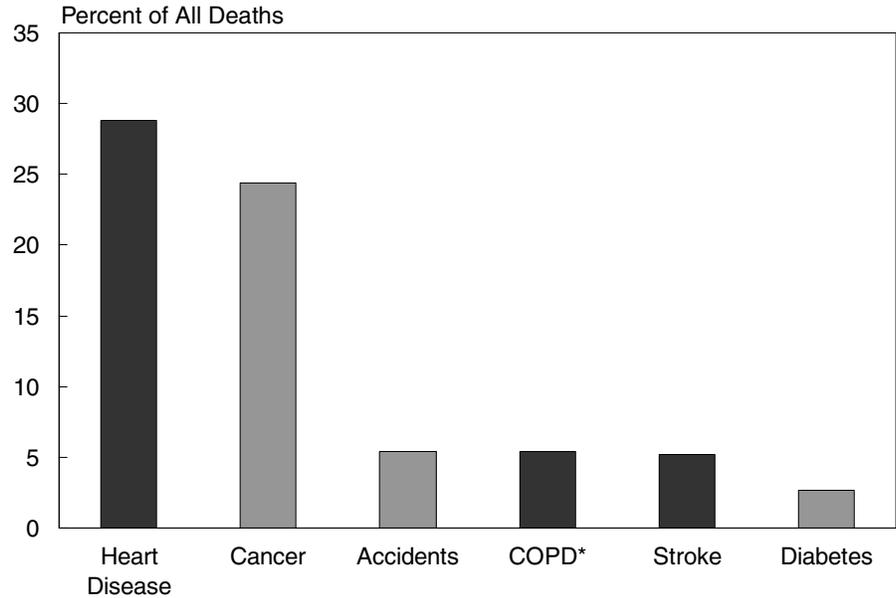
* Chronic lower respiratory diseases.

In 2002, heart disease was the third leading cause of death for those aged 25–44, second for those aged 45–64, and first for those aged ≥65. Stroke ranked fourth for those aged 45–64 and third for those aged ≥65. COPD and allied conditions ranked sixth for those aged 45–64 and fourth for those aged ≥65.²⁵

Background Data

Chart 2-10
Leading Causes of Death,
White Males, U.S., 2002

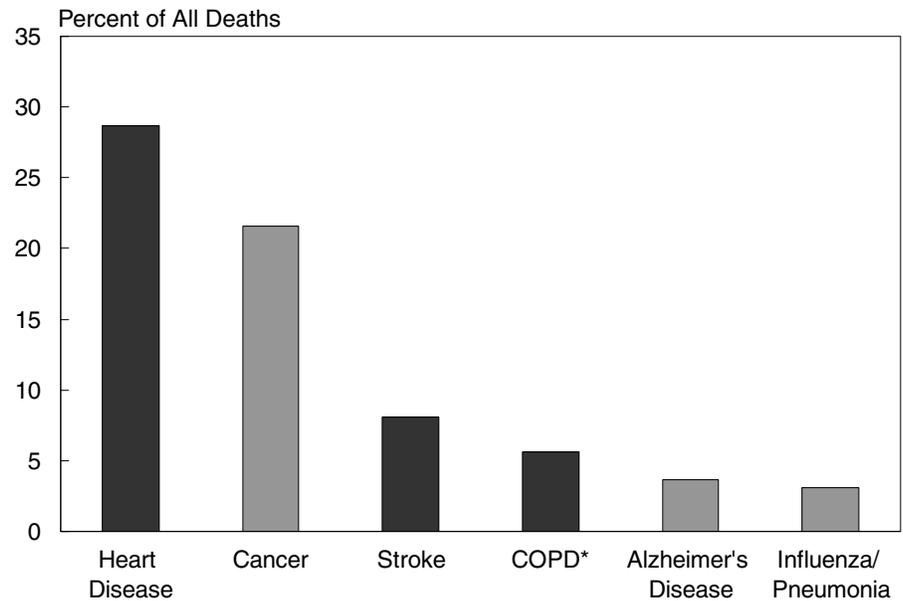
In 2002, among white males, heart disease, COPD and allied conditions, and stroke were the first, fourth, and fifth leading causes of death, respectively.²⁸



* COPD and allied conditions.

Chart 2-11
Leading Causes of Death,
White Females, U.S., 2002

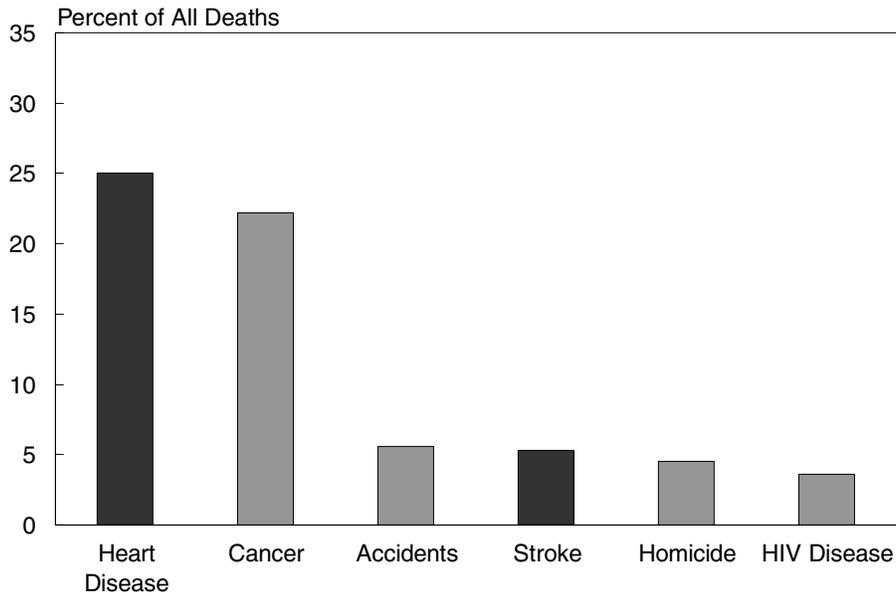
In 2002, among white females, heart disease, stroke, and COPD and allied conditions were the first, third, and fourth leading causes of death, respectively.²⁸



* COPD and allied conditions.

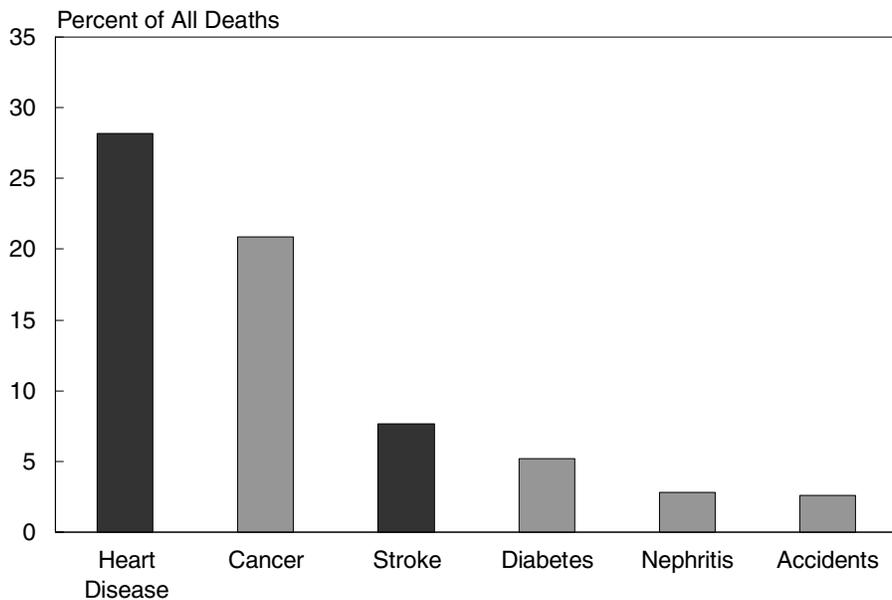
Background Data

Chart 2-12
Leading Causes of Death,
Black Males, U.S., 2002



In 2002, among black males, heart disease and stroke were the first and fourth leading causes of death, respectively.²⁸

Chart 2-13
Leading Causes of Death,
Black Females, U.S., 2002

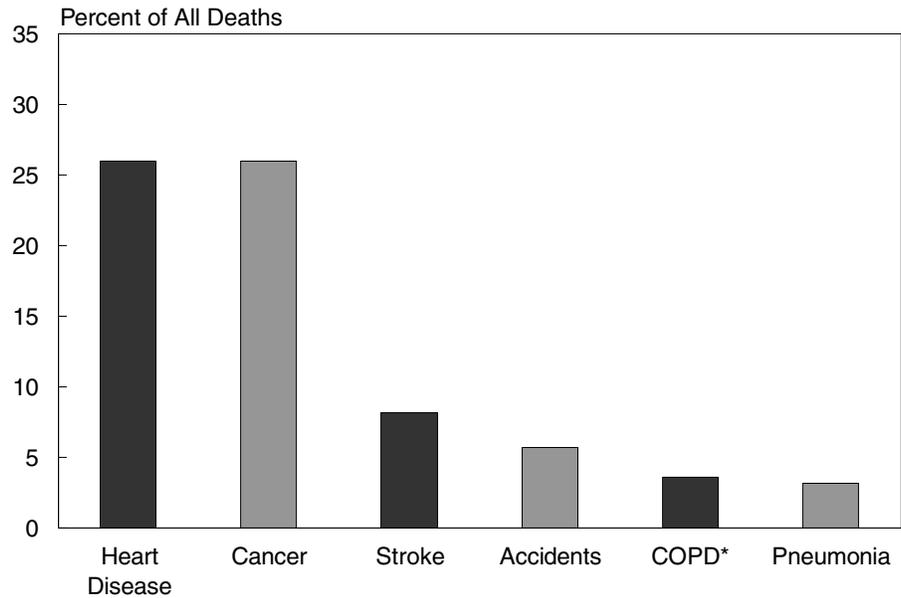


In 2002, among black females, heart disease and stroke were the first and third leading causes of death, respectively.²⁸

Background Data

Chart 2-14
Leading Causes of Death,
Asian Males, U.S., 2001

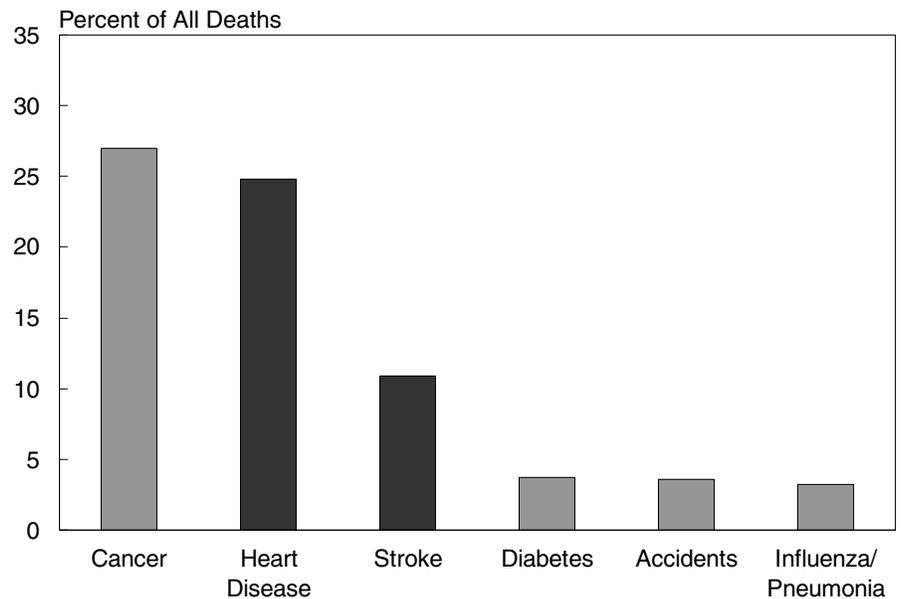
In 2001, among Asian males, heart disease, stroke, and COPD and allied conditions were the first, third, and fifth leading causes of death, respectively.⁶



* COPD and allied conditions.

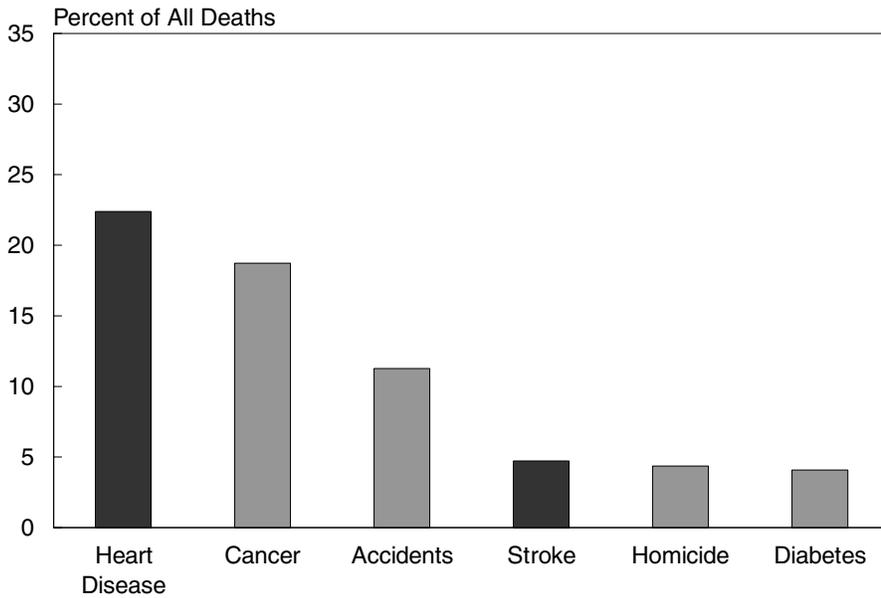
Chart 2-15
Leading Causes of Death,
Asian Females, U.S., 2001

In 2001, among Asian females, heart disease and stroke were the second and third leading causes of death, respectively.⁶



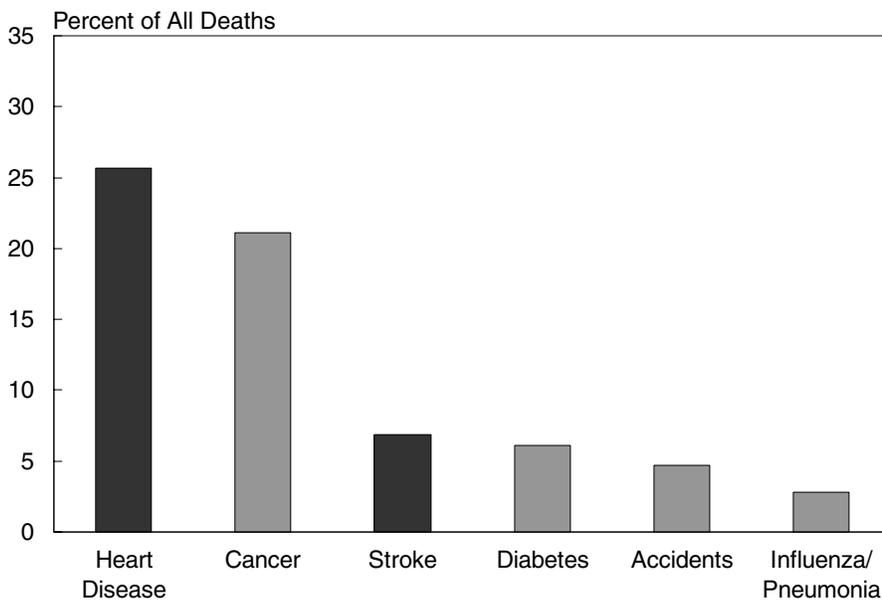
Background Data

Chart 2–16
Leading Causes of Death,
Hispanic Males, U.S., 2001



In 2001, among Hispanic males, heart disease and stroke were the first and fourth leading causes of death, respectively.⁶

Chart 2–17
Leading Causes of Death,
Hispanic Females, U.S., 2001



In 2001, among Hispanic females, heart disease and stroke were the first and third leading causes of death, respectively.⁶

Chart 2-18
Leading Causes of Death,
American Indian Males, U.S., 2001

In 2001, among American Indian males, heart disease was the leading cause of death.⁶

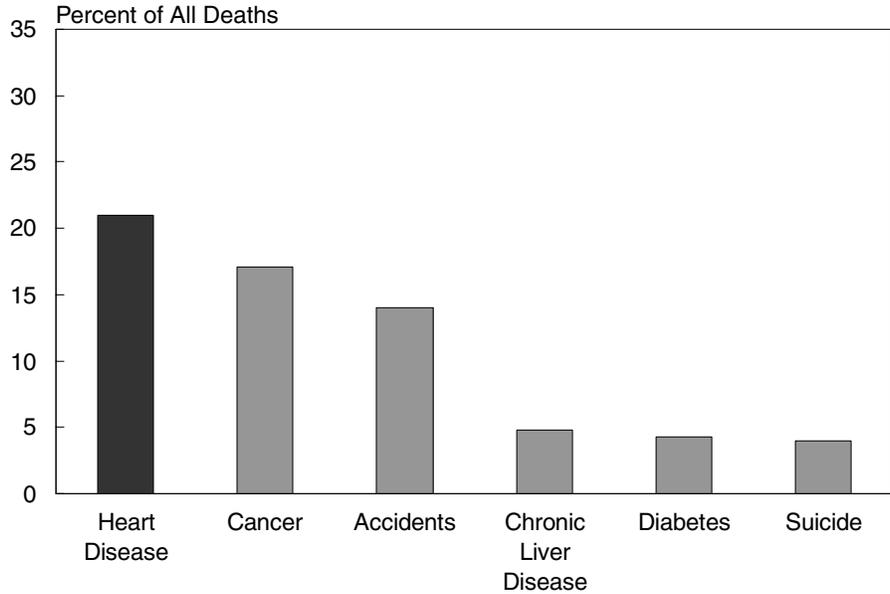
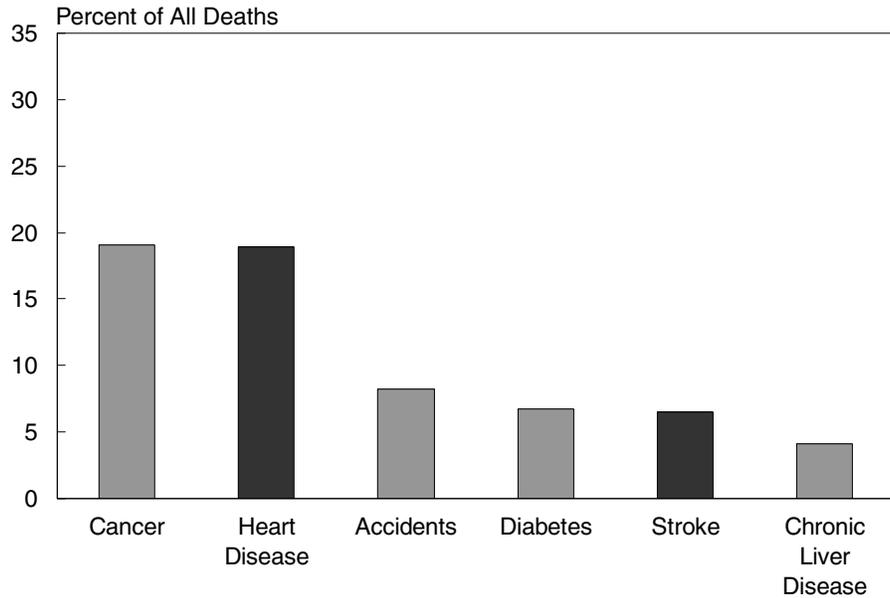


Chart 2-19
Leading Causes of Death,
American Indian Females, U.S., 2001

In 2001, among American Indian females, heart disease and stroke were the second and fifth leading causes of death, respectively.⁶



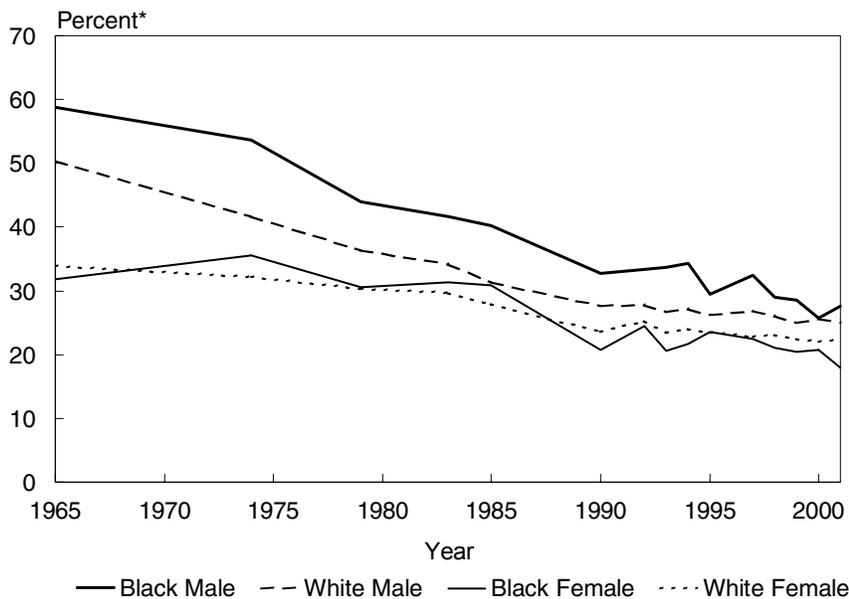
Background Data

Chart 2–20
Leading Chronic Conditions
Causing Limitations of Activity, 2000

Chronic Condition	Persons (Millions)
Arthritis	5.9
Back/neck conditions	5.2
Heart condition	4.4
Injury	3.7
Hypertension	3.0
Diabetes	2.8
Lung condition	2.6
Mental condition	2.5
Vision condition	2.1
Stroke	1.6
Musculoskeletal condition	1.3
Cancer	1.3
Hearing condition	1.2

In 2000, heart disease was the third leading chronic condition causing activity limitation. Hypertension, lung condition, and stroke were also very common.²³

Chart 2–21
Percent of Population Currently Smoking
by Race and Sex, Ages 18 and Over, U.S., 1965–2001



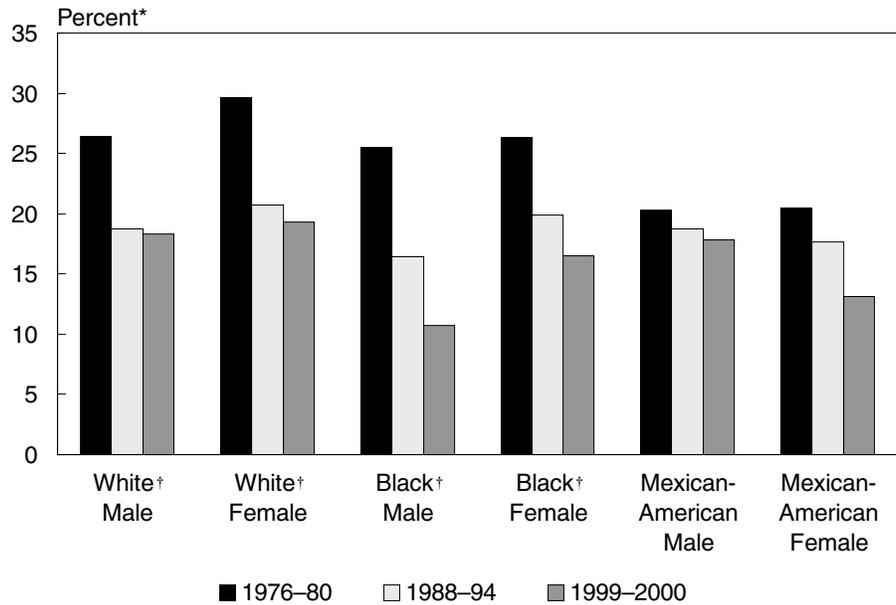
Between 1965 and 1990, the percent of the population, aged ≥ 18 , who smoked cigarettes decreased significantly. Since then, the percent of the population who smoked remained relatively stable.²⁹

* Age adjusted.

Background Data

Between 1976–80 and 1999–2000, the prevalence of high total serum cholesterol declined for each sex and race/ethnic group.²⁹

Chart 2–22
Percent of Population With High Serum Cholesterol
by Race and Sex, Ages 20–74, U.S., 1976–80 to 1999–2000



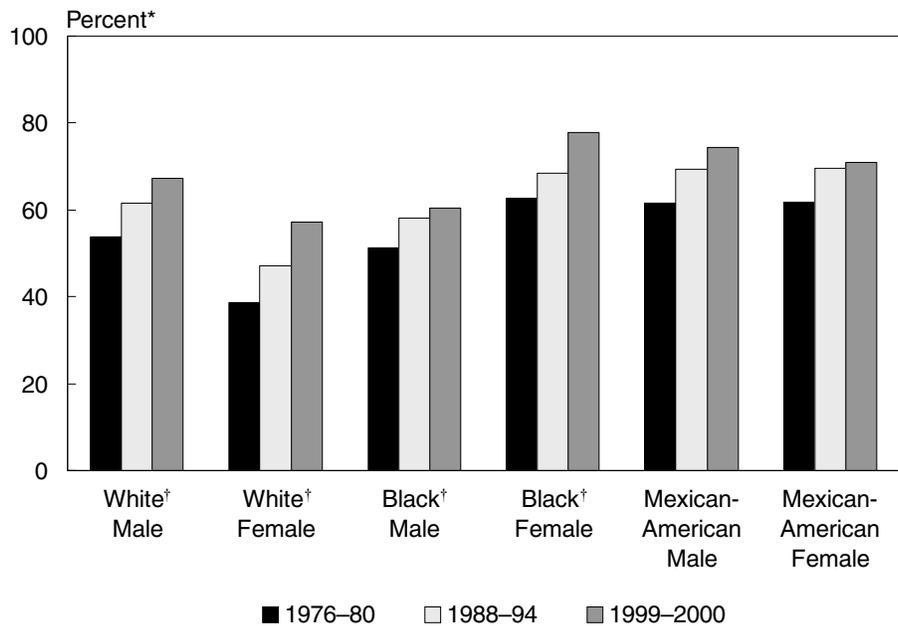
* Age adjusted.

† Non-Hispanic.

Note: High serum cholesterol is 240+ mg/dL.

Chart 2–23
Percent of Population That Is Overweight
by Race and Sex, Ages 20–74, U.S., 1976–80 to 1999–2000

Between 1976–80 and 1999–2000, the prevalence of overweight males and females increased for each race/ethnic group.²⁹



* Age adjusted.

† Non-Hispanic.

Note: Overweight is a body mass index of 25 kg/m².

Background Data

Chart 2–24
Economic Cost of Cardiovascular, Lung, and
Blood Diseases, U.S., 2004

Disease	Dollars (Billions)			
	Total	Direct	Morbidity	Mortality
Total CVD	368.4	226.7	33.6	108.1
Heart disease	238.6	130.6	20.6	87.4
Coronary	133.2	66.3	9.1	57.8
Congestive Heart Failure	25.8	23.7	*	2.1
Stroke	53.6	33.0	6.1	14.5
Hypertensive disease	55.5	41.5	7.2	6.8
Selected lung diseases	131.9	75.9	25.9	30.1
COPD	37.2	20.9	7.4	8.9
Asthma	16.1	11.5	2.9	1.7
Selected blood diseases	11.5	8.0	0.7	2.8
Anemias	7.0	5.4	0.6	1.0

* No estimate available.

Annual expenditure for health and lost productivity due to cardiovascular, lung, and blood diseases cost the Nation billions of dollars. Costs for these diseases as secondary causes of morbidity and mortality were not included.^{6, 27, 30–37}

Chart 2–25
Direct Cost of Cardiovascular, Lung, and
Blood Diseases, U.S., 2004

Disease	Dollars (Billions)					
	Total	Hospital Care	Physicians Services*	Prescription Drugs	Home Health Care	Nursing Home Care
Total CVD	226.7	101.7	33.4	43.3	10.3	38.1
Heart disease	130.6	72.0	17.1	18.3	4.6	18.5
Coronary	66.3	37.0	9.6	8.5	1.4	9.7
Congestive Heart Failure	23.7	13.6	1.8	2.7	2.1	3.5
Stroke	33.0	13.7	2.7	1.1	2.7	12.8
Hypertensive disease	41.5	5.5	9.6	21.0	1.5	3.8
Selected lung diseases	75.9	45.0	11.5	12.9	2.6	3.9
COPD	20.9	8.6	3.8	5.0	0.7	2.8
Asthma	11.5	3.6	2.9	5.0	†	†
Selected blood diseases	8.0	4.0	1.8	0.7	0.7	0.8
Anemias	5.4	2.5	1.2	0.5	0.5	0.7

* Physicians, clinics, and other professional services.

† No estimate available.

Among the direct cost (health expenditures) for cardiovascular, lung, and blood diseases (except stroke), hospital care ranked highest. For stroke, the expenditure for nursing home care was slightly higher than the cost of hospital care.^{27, 30–33, 36–37}

3. Cardiovascular Diseases

The diagnostic group *cardiovascular diseases* as used here includes diseases and congenital anomalies of the circulatory system as coded in the ICD.

Charts 3–1 through 3–3 show the 2001 distribution of CVD deaths, heart disease deaths, and stroke deaths, respectively. Chart 3–4 contains a list of CVD, their 9th revision ICD codes, 2002 estimates of hospital discharges and length of stay, 2001 estimates of physician office visits for the diagnostic codes, 10th revision ICD codes for the CVD, and number of deaths in 2001 for those codes. Subsequent charts display morbidity and mortality for total CVD, total heart disease, and selected subgroups.

Coronary Heart Disease

Identifying CHD as the underlying cause of death is sometimes difficult because the diagnostic information available at the time of death can be insufficient to distinguish accurately among the various forms of heart disease. This applies to AMI and angina pectoris—two conditions included under the CHD category. Although their classification may be of limited use in identifying general mortality, it is useful for prevalence and hospitalization and office visit statistics.

Acute coronary syndrome is used increasingly to describe patients who present with AMI or unstable angina (unexpected chest pain or discomfort that usually occurs while at rest). The latter can be more severe or prolonged than typical angina or be the first time a person has angina.

In 2002, 942,000 inpatient hospitalizations comprise the acute coronary syndrome: 818,000 for AMI as a primary diagnosis and 124,000 for unstable angina (Chart 3–4). The total figure is a conservative estimate since it is limited to primary diagnosis. Adding hospitalizations of acute coronary syndrome as a secondary diagnosis would result in a less conservative estimate of 1.6 million hospitalizations.²⁷

Over the years, multiple revisions of the ICD have led to changes in the codes for CHD. These revisions complicate the determination of mortality trends because subgroups within the categories change. The

category CHD, in the ICD/10, was expanded to include “Atherosclerotic CVD.” Therefore, CHD death rates prior to ICD/10 coding (1999) were tabulated to include the additional term to ensure uniformity in classification of CHD mortality from 1950 to 2002. As a result, these CHD death rates are higher than those in previous issues of the *Chart Book*.

Congestive Heart Failure

Congestive Heart Failure (CHF) is a sequela of various heart diseases. It is a heart “condition,” not a heart “disease,” and is more common as a contributing rather than an underlying cause of death. Thus, it is imprecise to classify CHF as an underlying cause of death. The condition, however, is increasingly prevalent and common in hospitalizations and mortality reporting. In fact, hospitalizations and mortality for CHF have increased (until very recently), while mortality for total heart diseases has declined.

In this book, death rates in the Congestive Heart Failure section are coded for heart failure, a broader category that includes CHF; left ventricular failure; and heart failure, unspecified. Most of the deaths in this category are due to CHF.

Cardiomyopathy

In 2001, almost 27,000 deaths were attributed to cardiomyopathy even though no consensus exists on classification and diagnostic criteria for the disease. It is assumed that this limitation has little effect on any mortality differences influenced by age, race, or sex.

Atrial Fibrillation and Other Heart Diseases

The number of patients hospitalized with atrial fibrillation has been increasing, but the number of deaths caused by it is uncertain because the diagnostic information on the death certificate is inadequate. Diseases of pulmonary circulation, acute and subacute endocarditis, and cardiac dysrhythmias are additional heart diseases of interest. Because measures of their morbidity, and especially their mortality are of uncertain

quality, no charts pertaining to them have been included.

Cerebrovascular Diseases (Stroke)

Cerebrovascular disease, i.e., stroke, is the third leading cause of death. Only a small proportion of deaths from stroke can be classified as cerebral hemorrhage, occlusion, thrombosis, or embolism. Most are coded to unspecified forms of cerebrovascular disease (Chart 3–3). Thus, mortality for the entire category is presented in charts related to stroke.

Hypertensive Disease

Prevalence and trend data on awareness, treatment, and control of hypertension are important statistics associated with hypertension morbidity and have therefore been included in this chapter. Prevalence of hypertension is normally determined from an average of at least three blood pressure readings. Data presented in Chart 3–62 and Chart 3–63, however, were determined from just one reading.

Mortality statistics for hypertensive disease are not described because it is not a distinct underlying cause

of death. In fact, its presence on death certificates is often arbitrary, and its selection as the underlying cause of death is often characterized by a lack of good diagnostic information at the time of death.

Diseases of Arteries

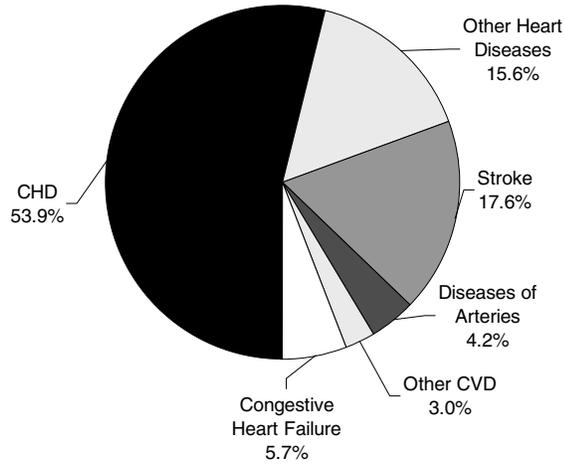
The ICD term *diseases of arteries* is used to refer to peripheral arterial disease and includes a variety of atherosclerotic disorders; none of them specifically involve the heart or brain. Examples are aortic aneurysm, atherosclerosis of the extremities, arterial embolism and thrombosis, and generalized atherosclerosis. Mortality data are presented, but valid prevalence estimates are unavailable.

Congenital Malformations of the Circulatory System

The ICD term *congenital malformations of the circulatory system* includes congenital heart disease. Because most deaths in this category occur in infants younger than 1 year of age, the preferred mortality tabulation is the infant mortality rate.

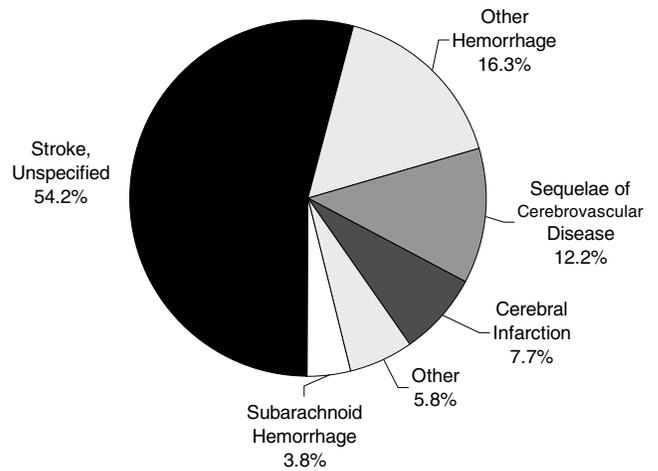
Cardiovascular Diseases

Chart 3-1
Cardiovascular Disease Deaths,
Percent by Subgroup, U.S., 2001



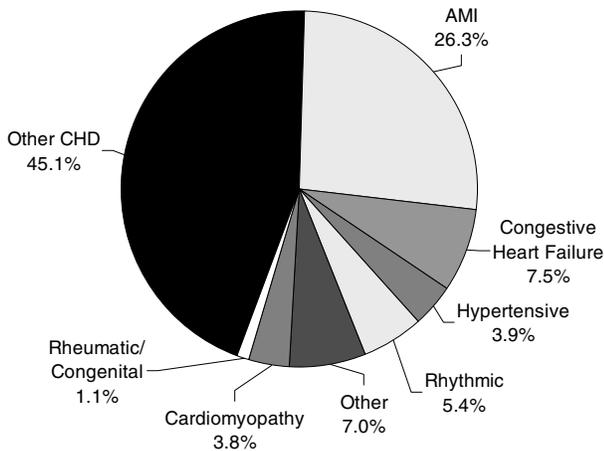
Total Deaths = 931,108 (100%), including congenital CVD, ICD/10 codes Q20-Q28.

Chart 3-3
Stroke Deaths,
Percent by Subgroup, U.S., 2001



Total Deaths = 163,538 (100%)

Chart 3-2
Heart Disease Deaths,
Percent by Subgroup, U.S., 2001



Total Deaths = 703,455 (100%), including 3,313 from congenital heart disease, ICD/10 codes Q20-Q24.

Cardiovascular Diseases

Chart 3-4
**Number of Hospitalizations, Physician Office Visits, and
 Deaths for Cardiovascular Diseases, U.S., 2001 and 2002***

Diagnostic Category	ICD/9 Codes	Hospitalizations			ICD/10 Codes	Deaths
		First-Listed Discharge (1,000)	Length of Stay (Days)	Physician Office Visits (1,000)		
Total	390-459, 745-747	6,417	4.7	71,416	I00-I99, Q20-Q28	931,108
Heart Disease	390-398, 402, 404-429	4,446	4.6	25,721	I00-I09, I11, I13, I20-I51	700,142
Rheumatic heart disease	390-398	52	7.0	158	I00-I09	3,489
Hypertensive heart disease	402, 404	125	5.3	428	I11, I13	27,515
Coronary heart disease	410-414, 429.2	2,125	4.2	11,799	I20-I25	502,189
AMI	410	818	5.6	193	I21, I22	184,757
Angina pectoris, stable	413	58	2.1	1,216	I20.1-I20.9	298
Angina pectoris, unstable	411	124	2.4	240	I20	83
Atherosclerotic CVD	429.2	0	0.0	157	I25.0	68,103
Other CHD	412, 414	1,125	3.8	10,233	Other I23-I25	248,948
Diseases of pulmonary circulation	415-417	111	6.3	473	I26-I28	13,320
Pulmonary embolism	415.1	99	6.3	237	I26	8,627
Other	415.0, 415.2-417	12	6.1	236	I27-I28	4,693
Subacute bacterial endocarditis	421	18	14.0	19	I33.0	1,145
Cardiomyopathy	425	36	3.6	548	I42	26,863
Atrial fibrillation and flutter	427.3	465	3.6	3,210	I48	9,451
Other arrhythmic disorders	Other 427	323	3.5	2,725	Other I43-I49	29,103
Heart failure	428	973	5.4	4,349	I50	56,934
Congestive heart failure	428.0	970	5.4	4,190	I50.0	52,828
Left heart failure and unspecified	428.1-428.9	3	4.3	159	I50.1, I50.9	4,106
Other heart disease	Other 420-429	212	5.2	2,012	Other I30-I52	30,133
Other hypertensive disease	401, 403	410	3.3	34,580	I10-I12	19,250
Cerebrovascular diseases	430-438	942	5.3	2,855	I60-I69	163,538
Diseases of arteries	440-448	272	6.4	3,083	I70-I79	39,404
Atherosclerosis	440	111	6.8	283	I70	14,086
Aortic aneurysm	441	61	6.9	106	I71	15,234
Other diseases of arteries	442-448	100	5.8	2,194	I72-I78	10,084
Deep vein thrombosis	451.1	8	5.2	0	I80.2	2,730
Other and unspecified CVD	Other 451-459	288	4.8	4,811	Other I80-I99	1,935
Congenital malformations of CV system	745-747	51	7.8	366	Q20-Q28	4,109
Congenital heart disease	745-746	35	7.5	250	Q20-Q24	3,313
Other congenital cardiovascular disease	747	16	8.3	116	Q25-Q28	877

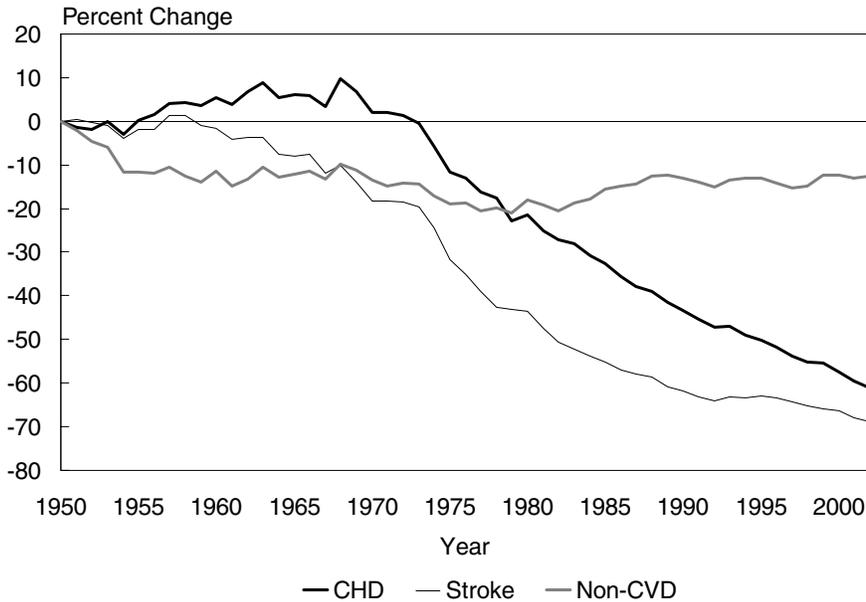
* 2002 for Hospitalizations and 2001 for Physician Office Visits and Deaths.

Note: Estimates of hospitalizations and physician office visits are subject to sampling variability. Estimates of hospitalizations below 50,000 have a relative standard error of >11%. Estimates of physician office visits below 588,000 have a relative standard error of >30%.

Compiled from references 27, 28, and 32.

Cardiovascular Diseases

Chart 3-5
Change in Age-Adjusted Death Rates
Since 1950, U.S., 1950-2002



The CHD death rate increased 10% from 1950 to its peak in 1968; by 2002, it was 61% lower than it was in 1950. Stroke mortality, on the other hand, declined for most of those years and by 2002 was 69% lower than it was in 1950. By comparison, the death rate for noncardiovascular causes decreased only 12.6% since 1950.^{5-6, 25-26, 28}

Chart 3-6
Age-Adjusted Death Rates and Percent Change for All Causes and
Cardiovascular Diseases, U.S., 1972 and 2002

Cause of Death	Deaths/100,000 Pop.		1972-2002 Difference	Percent Change
	1972	2002		
All causes	1,214.8	846.8	-368.0	-30.3
CVD*	695.4	318.7	-376.7	-54.2
CHD	445.5	170.6	-275.4	-61.7
CHF	9.3	19.5	10.2	109.7
Stroke	147.3	56.3	-91.0	-61.8
Other CVD	93.3	72.3	-21.0	-22.5
Non-CVD	519.4	528.1	8.7	1.7

* Excludes congenital malformations of the circulatory system.

Between 1972 and 2002, the CVD death rate declined 54% compared with 1.7% increase for all non-CVD causes of death. CHD and stroke mortality declined 62%. CHF, however, more than doubled.^{5-6, 25-26, 28}

Cardiovascular Diseases

Chart 3-7

Average Annual Percent Change in Age-Adjusted Death Rates
for All Causes and Cardiovascular Diseases, U.S., 1965-2002

CVD mortality declines continued. The latest average annual percent declines were 3.4% for CVD, 4.5% for CHD, and 3.2% for stroke.^{5-6, 25-26, 28}

Period	All Causes	Total CVD*	CHD†	Stroke†	Other CVD	All Other Causes
1965-1970	-1.1	-1.9	-0.3	-2.2	-7.0	-0.1
1970-1975	-2.0	-2.7	-2.7	-3.2	-1.8	-1.2
1975-1980	-1.4	-2.4	-2.7	-3.9	-0.5	-0.1
1980-1985	-0.9	-2.4	-2.9	-4.4	-1.0	0.6
1985-1990	-1.0	-2.9	-3.3	-3.1	-2.0	0.8
1990-1998	-0.8	-1.6	-2.8	-0.7	0.4	-0.2
1999-2002	-1.4	-3.4	-4.5	-3.2	-1.2	-0.2

* Excludes congenital malformations of the circulatory system.

† Comparability ratios applied to CHD and stroke rates 1979-98.

Chart 3-8

Average Annual Percent Change in Age-Adjusted Death Rates
for All Causes and Cardiovascular Diseases by Race and Sex,
U.S., 1999-2002

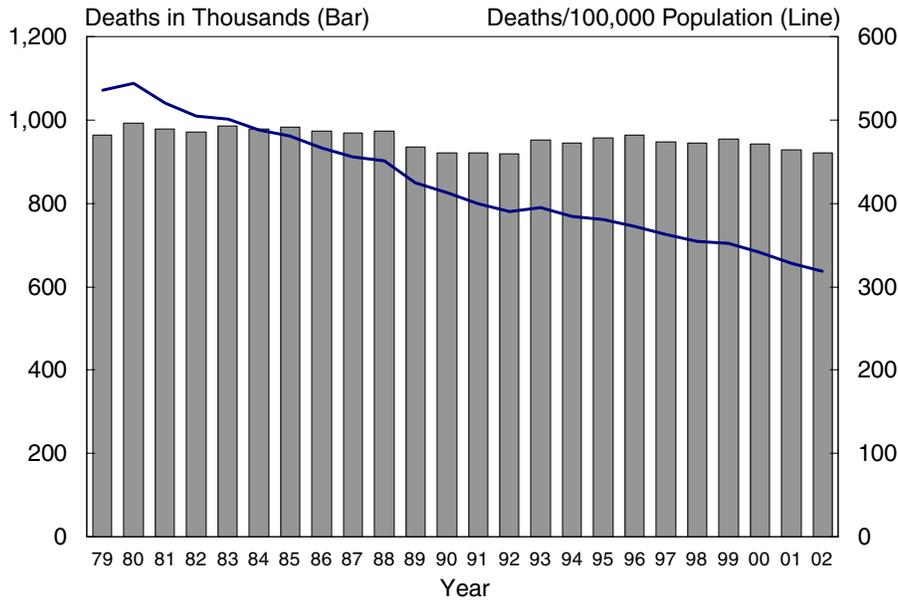
Between 1999 and 2002, declines in mortality for CVD, CHD, and stroke were greater for white males than for black males; they were similar for white and black females.^{5, 25-26, 28}

Cause of Death	Total	White Male	White Female	Black Male	Black Female
All causes	-1.4	-1.3	-1.1	-1.8	-2.3
CVD*	-3.4	-3.2	-3.4	-2.3	-3.4
Heart disease	-3.6	-3.3	-3.7	-2.6	-3.7
CHD	-4.5	-4.0	-4.9	-3.0	-4.6
CHF	-1.0	-0.6	-1.0	-1.1	-1.6
Stroke	-3.2	-3.3	-3.3	-2.4	-3.3
Non-CVD	-0.2	-0.1	0.4	-1.5	-1.5

* Excludes congenital malformations of the circulatory system.

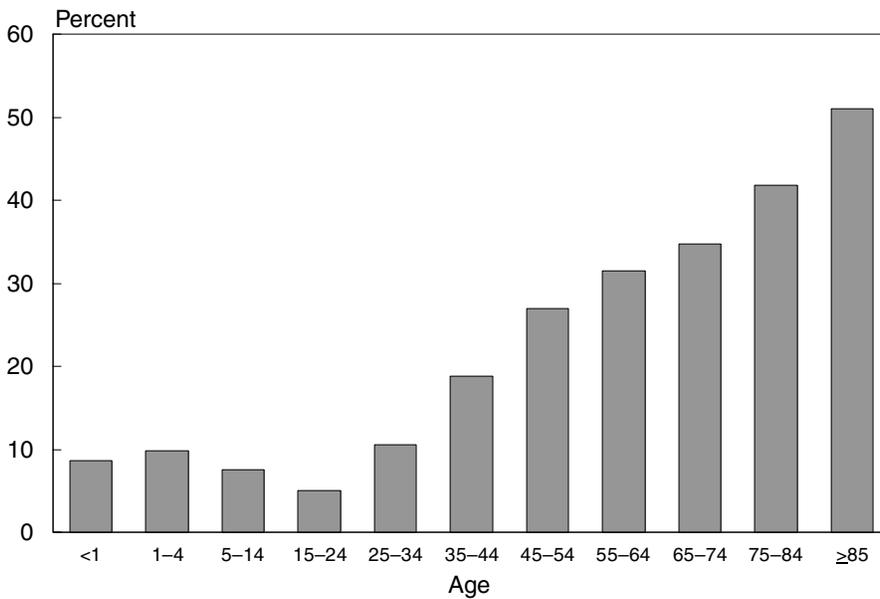
Cardiovascular Diseases

Chart 3-9
Deaths and Age-Adjusted Death Rates for Major Cardiovascular Diseases, U.S., 1979-2002



Age-adjusted CVD death rates declined considerably between 1979 and 2002, despite only a very modest decline in the total number of CVD deaths.^{5, 25-26}

Chart 3-10
Percent of All Deaths Due to Cardiovascular Diseases by Age, U.S., 2001

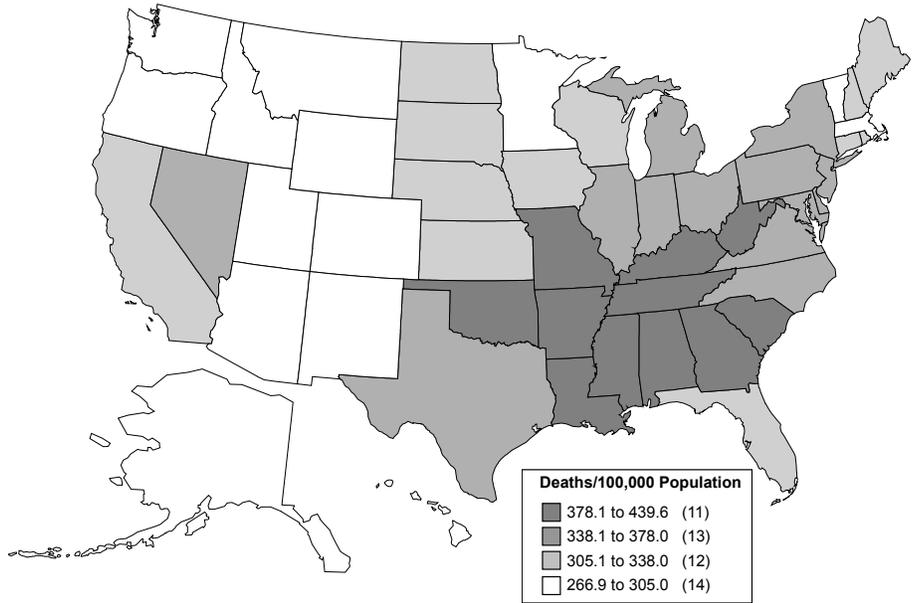


The percent of deaths due to CVD increased with age among adults. In 2001, it was 19% at ages 35-44 and 51% at ages ≥85.⁵

Cardiovascular Diseases

Chart 3–11
Age-Adjusted Death Rates for Cardiovascular Diseases*
by State, U.S., 1999–2000

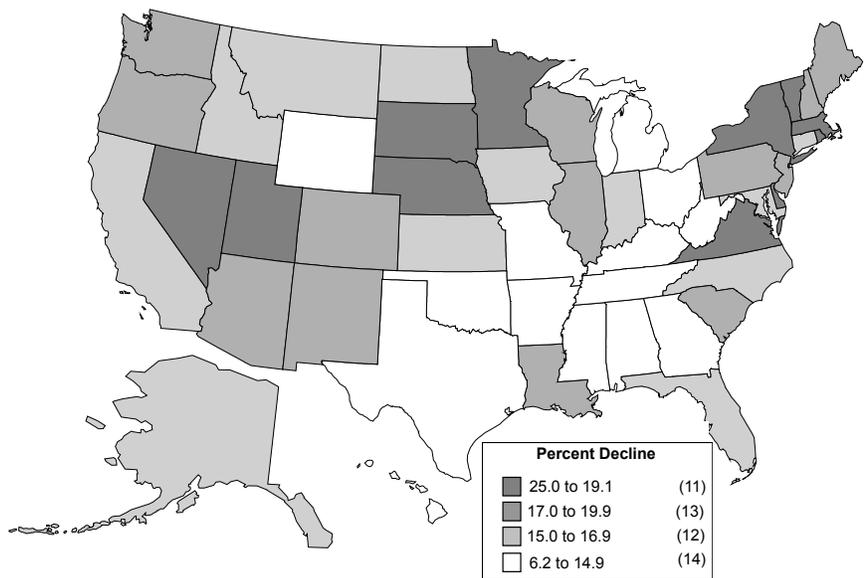
In 1999–2000, CVD mortality was higher in the East than in the West.⁵



* Excludes congenital malformations of the circulatory system.

Chart 3–12
Percent Decline in Age-Adjusted Death Rates for
Cardiovascular Diseases* by State, U.S., 1989–90 to 1999–2000

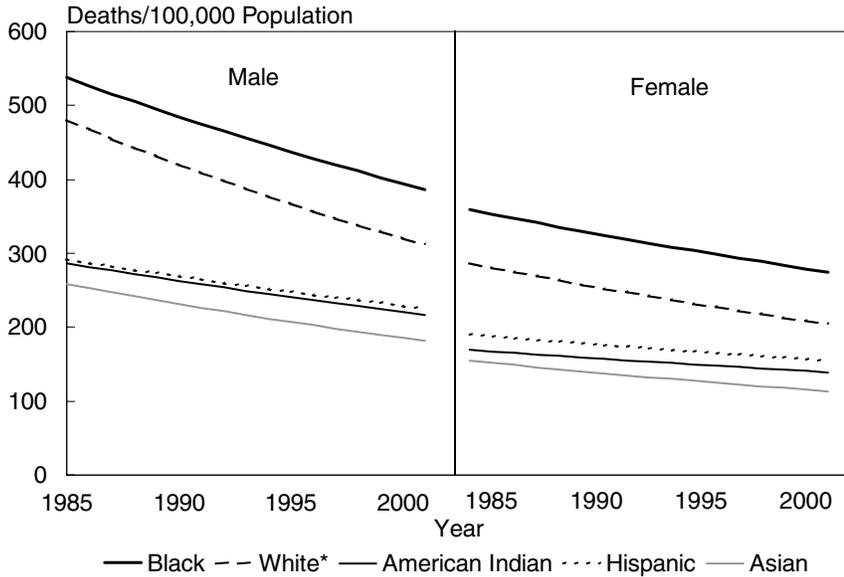
Between 1989–90 and 1999–2000, the smallest average annual percent declines in CVD death rates tended to be in the South.⁵



* Excludes congenital malformations of the circulatory system

Total Heart Disease

Chart 3-13
Age-Adjusted Death Rates for Heart Disease
by Race/Ethnicity and Sex, U.S., 1985-2001

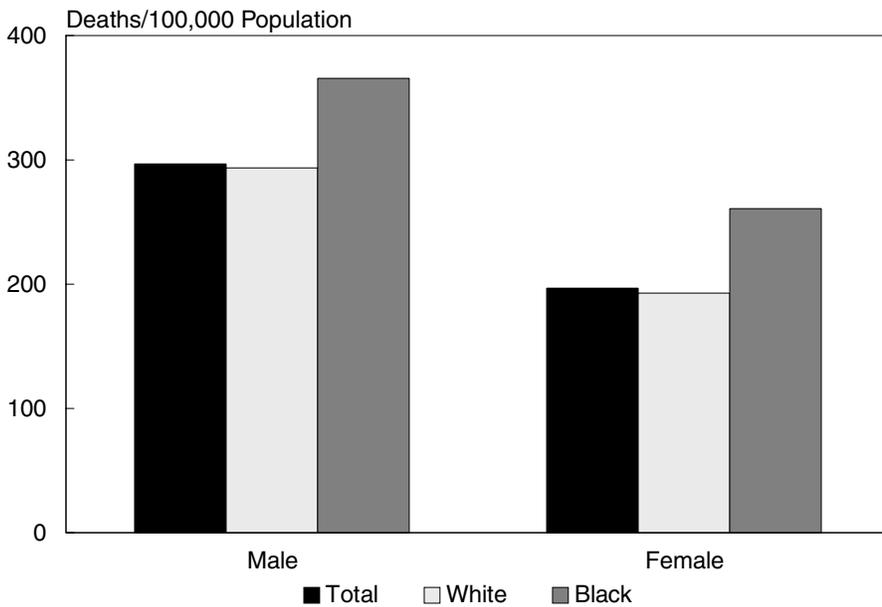


Between 1985 and 2001, heart disease death rates declined appreciably in blacks, whites, and Asians, and more modestly in American Indians and Hispanics.²⁹

* Non-Hispanic.

Note: Each line is a log linear regression derived from the actual rates.

Chart 3-14
Age-Adjusted Death Rates for Heart Disease
by Race and Sex, U.S., 2002



In 2002, heart disease mortality was 50% higher in males than in females. Among males, it was 24% higher in blacks than in whites and among females, it was 35% higher in blacks than in whites.²⁸

Total Heart Disease/Coronary Heart Disease

Chart 3-15
Death Rates for Heart Disease
by Age, Race, and Sex, U.S., 2002

Within sex groups, heart disease mortality was higher in blacks than in whites at all ages. Within race groups, it was higher in males than in females.²⁸

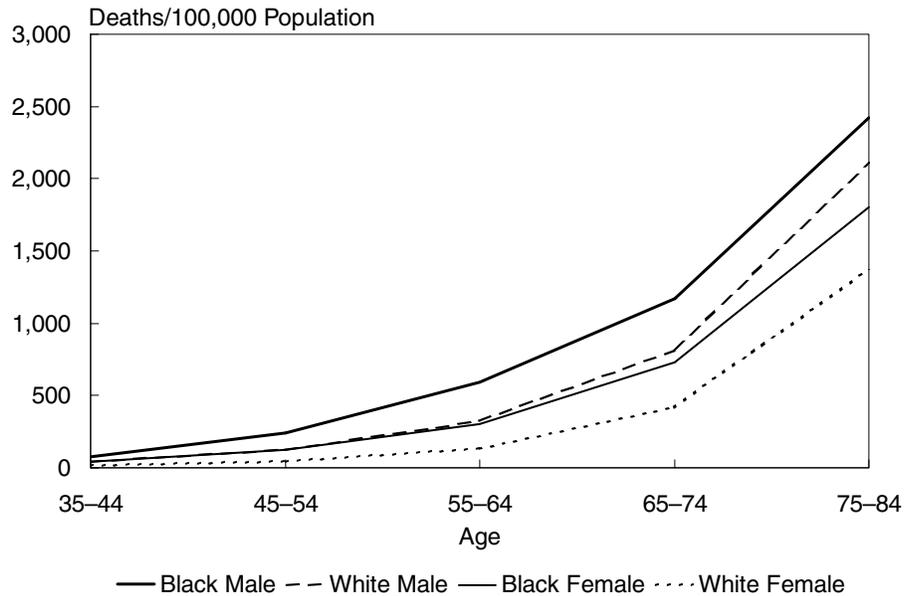
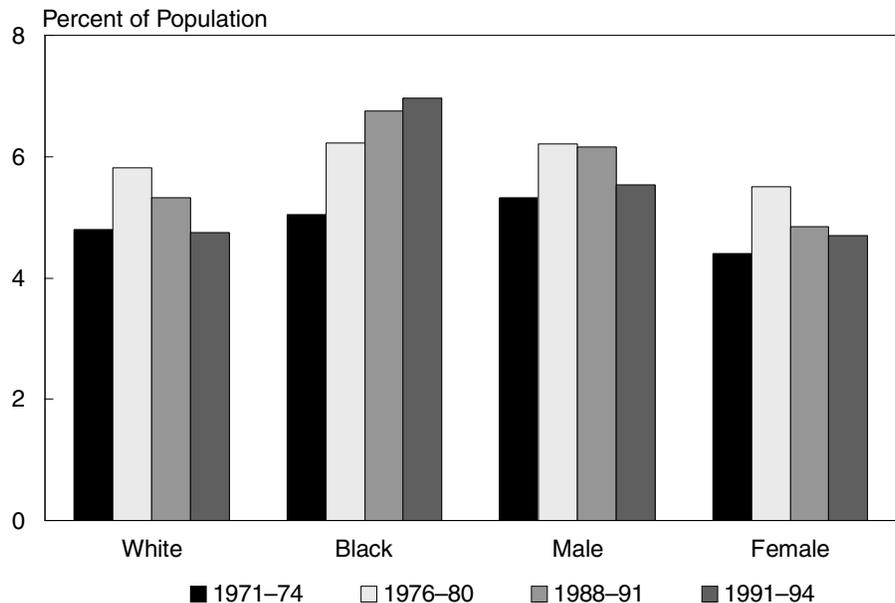


Chart 3-16
Prevalence* of Coronary Heart Disease by Race and Sex,
Ages 25-74, U.S., 1971-74 to 1991-94

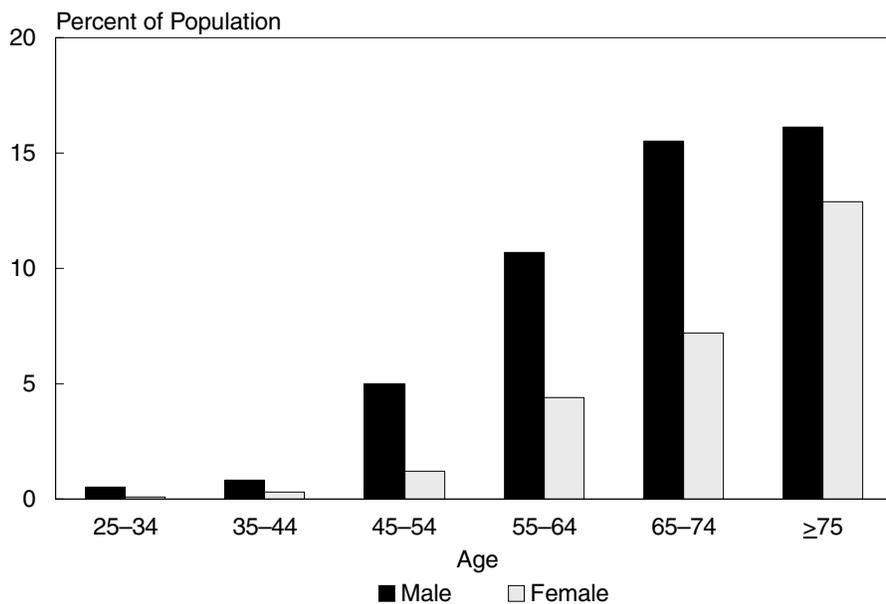
The prevalence of CHD increased in blacks between 1971-74 and 1991-94; it decreased in whites, males, and females between 1976-80 and 1991-94.¹⁷



* Age-adjusted.

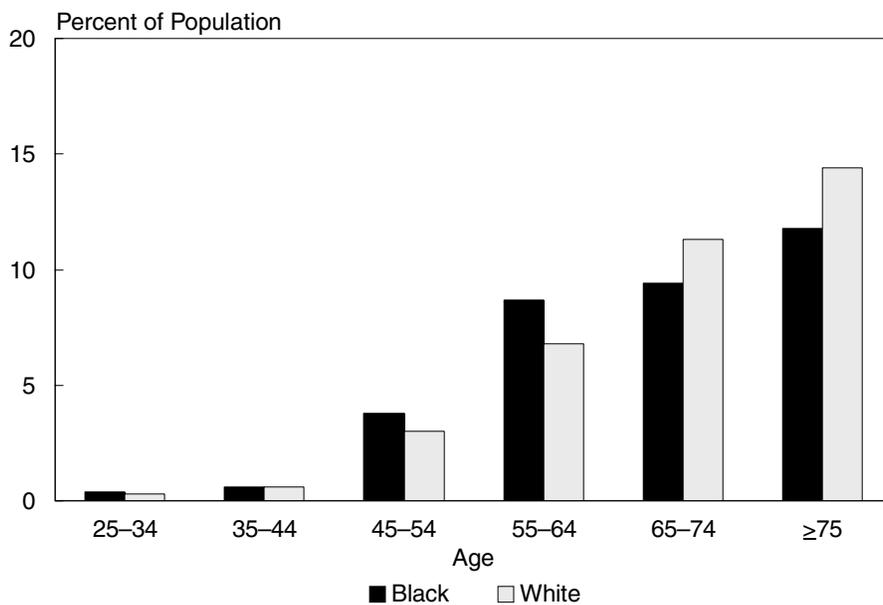
Coronary Heart Disease

Chart 3-17
Prevalence of Acute Myocardial Infarction
by Age and Sex, U.S., 1988-94



The prevalence of AMI was greater in males than in females at all ages.¹⁷

Chart 3-18
Prevalence of Acute Myocardial Infarction
by Age and Race, U.S., 1988-94



The prevalence of AMI at ages <65 was higher in blacks than in whites, but at ages ≥65 it was higher in whites.¹⁷

Coronary Heart Disease

Chart 3-19
Prevalence of Angina Pectoris by Age and Sex,
U.S., 1988-94

The prevalence of angina pectoris was greater in females aged 25-74; it was greater in males aged ≥ 75 .¹⁷

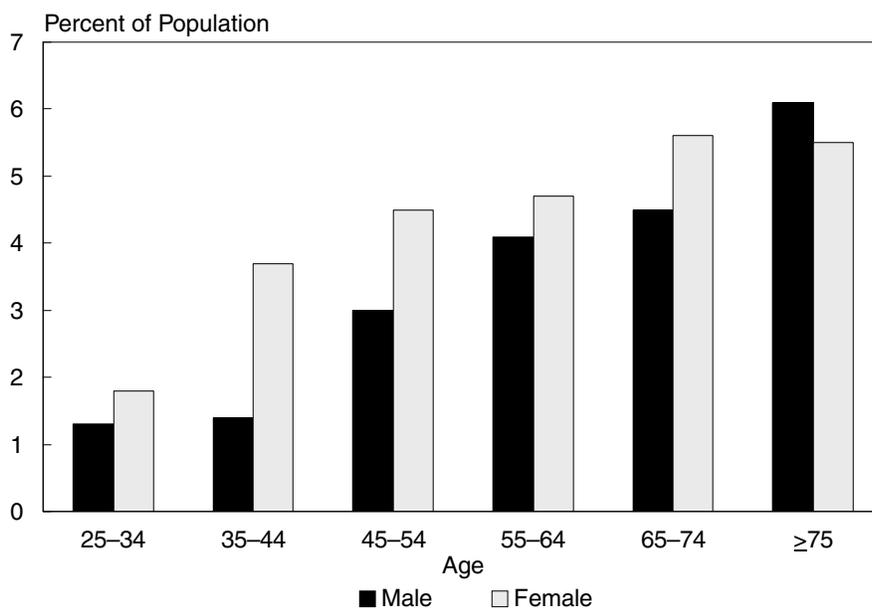
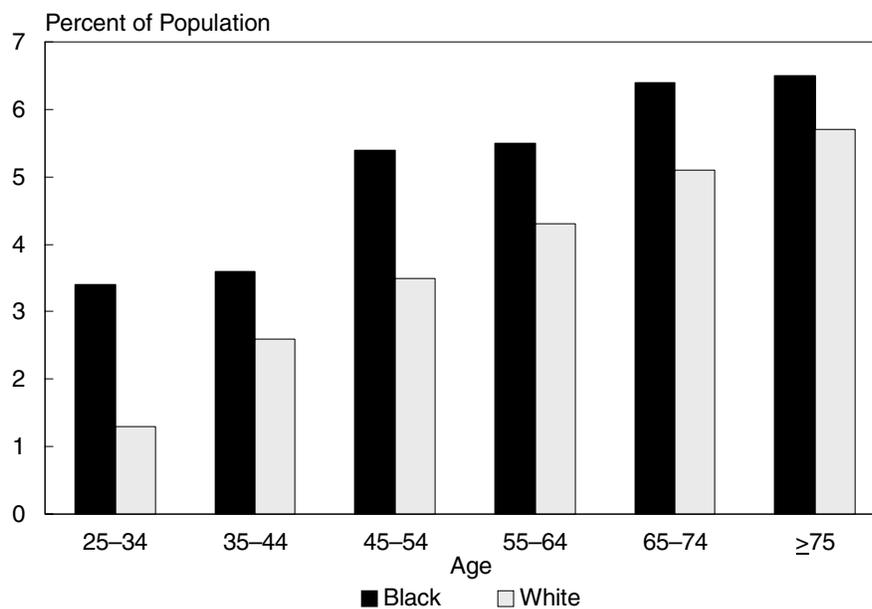


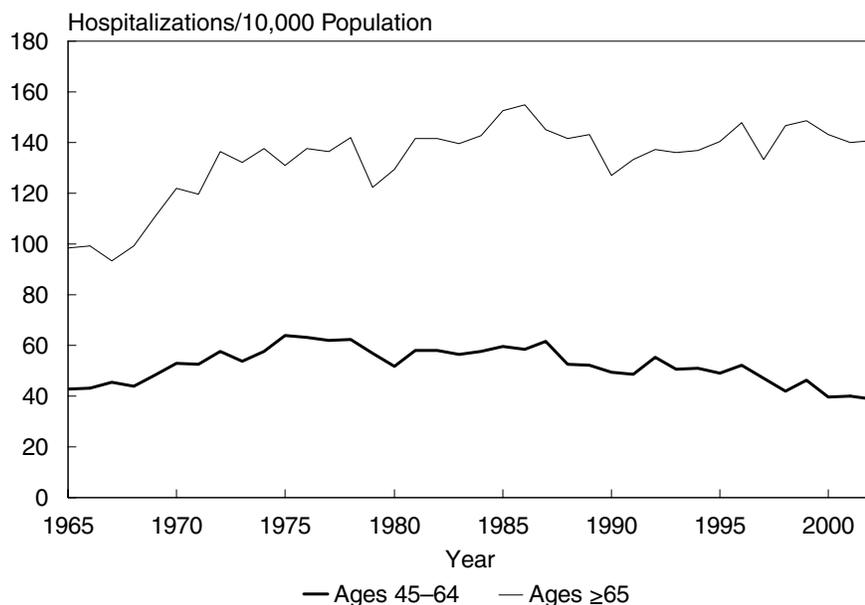
Chart 3-20
Prevalence of Angina Pectoris by Age and Race,
U.S., 1988-94

The prevalence of angina pectoris was greater in blacks than in whites at all ages.¹⁷



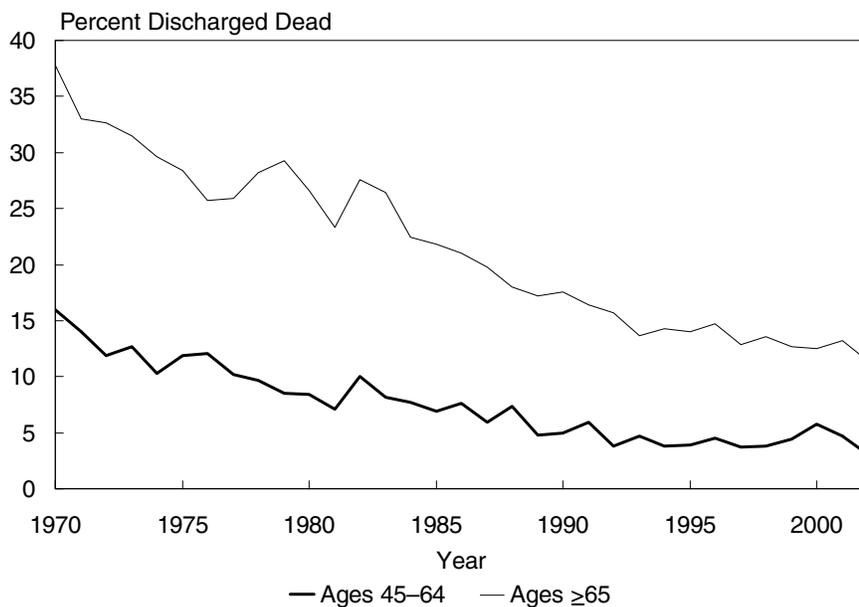
Coronary Heart Disease

Chart 3–21
Hospitalization Rates for Acute Myocardial Infarction,
Ages 45–64 and 65 and Over, U.S., 1965–2002



The AMI hospitalization rate for individuals aged 45–64 increased between 1965 and the mid-1970s; after that, it declined. For individuals aged ≥ 65 , the rate increased from 1965 to its peak in 1986. Since then, it has continued to fluctuate.²⁷

Chart 3–22
Hospital Case-Fatality Rates for Acute Myocardial Infarction,
Ages 45–64 and 65 and Over, U.S., 1970–2002



Between 1970 and 2002, AMI hospital case-fatality rates declined substantially for individuals aged 45–64 and ≥ 65 .²⁷

Coronary Heart Disease

Chart 3-23
Age-Adjusted Death Rates for Coronary Heart Disease, Actual and Expected, U.S., 1950-2002

CHD accounted for 494,000 deaths in 2002. It would have accounted for 1,394,000 deaths if the rate had remained at its 1968 peak.^{5-6, 25-26, 28}

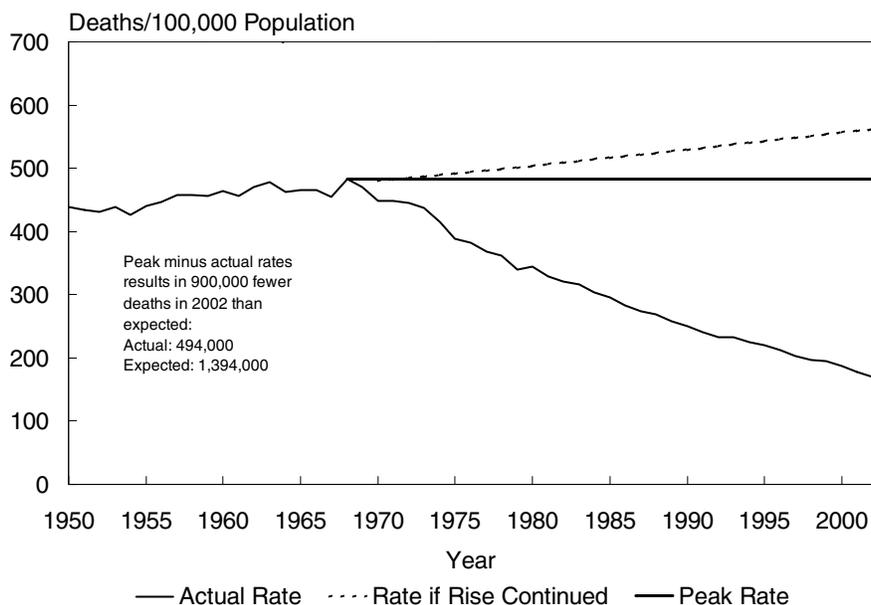
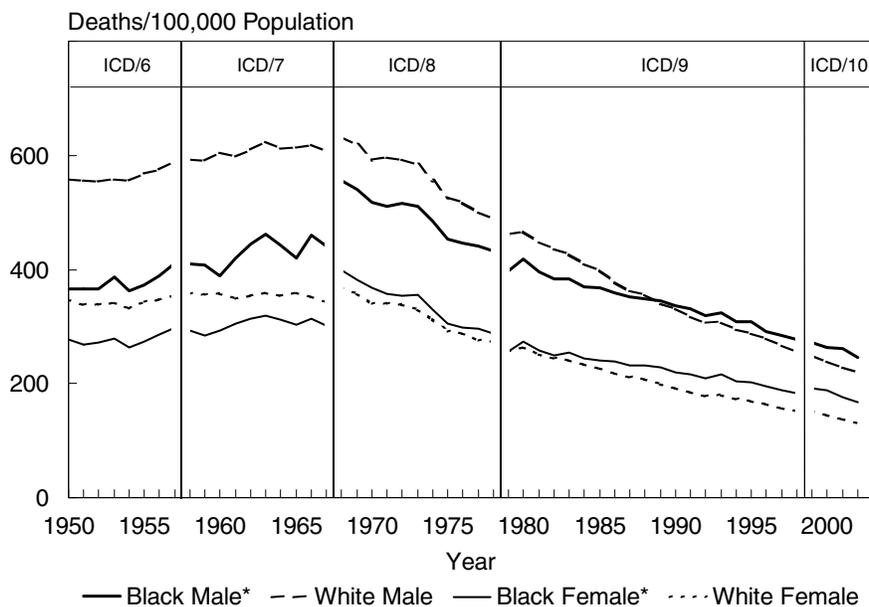


Chart 3-24
Age-Adjusted Death Rates for Coronary Heart Disease by Race and Sex, U.S., 1950-2002

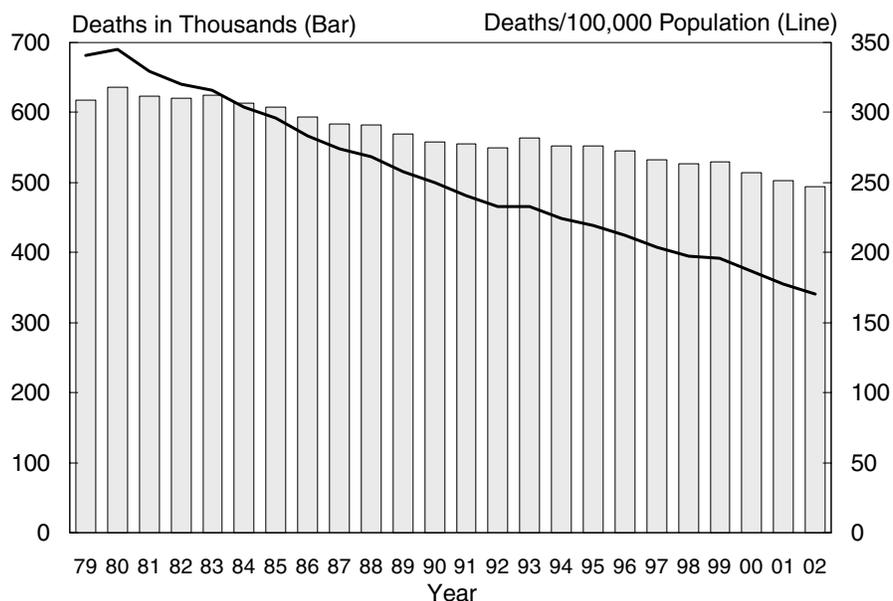
In the 1950s and 1960s, CHD death rates increased for blacks and white males; they were relatively stable for white females. Since then, the rates have declined appreciably.^{5-6, 28}



* Nonwhite from 1950 to 1967.

Coronary Heart Disease

Chart 3–25
Deaths and Age-Adjusted Death Rates for
Coronary Heart Disease, U.S., 1979–2002



Since 1980, the number of deaths and the age-adjusted death rates for CHD have decreased almost every year.^{5, 25–26}

Chart 3–26
Average Annual Percent Change in Age-Adjusted Death Rates
for Coronary Heart Disease by Race and Sex, U.S., 1950–2002

Period	Total Pop.	White Male	White Female	Black Male	Black Female
1950–1960	0.7	0.9	0.6	1.2	0.8
1960–1970	-0.1	0.1	-0.1	2.8	2.4
1970–1980	-3.1	-2.8	-3.2	-2.7	-3.5
1980–1990	-3.1	-3.4	-3.0	-1.9	-1.8
1990–1998	-2.8	-3.0	-2.7	-2.4	-2.2
1999–2002	-4.5	-4.0	-4.9	-2.9	-4.5

Since 1980, white males and females experienced steeper declines in CHD mortality than black males and females.^{5–6, 25–26, 28}

Coronary Heart Disease

Chart 3-27
Average Annual Percent Change in Death Rates for Coronary Heart Disease by Age, Race, and Sex, U.S., 1999-2002

Between 1999 and 2002, the average annual percent declines in CHD mortality tended to be smaller with advancing age for white males aged ≥ 65 and for white females and black males aged ≥ 55 .^{5, 28}

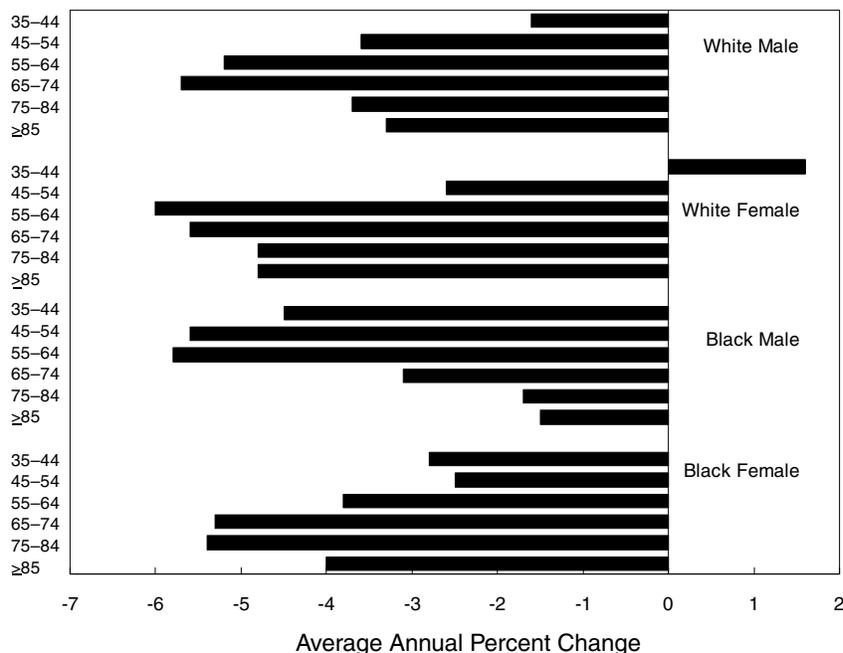
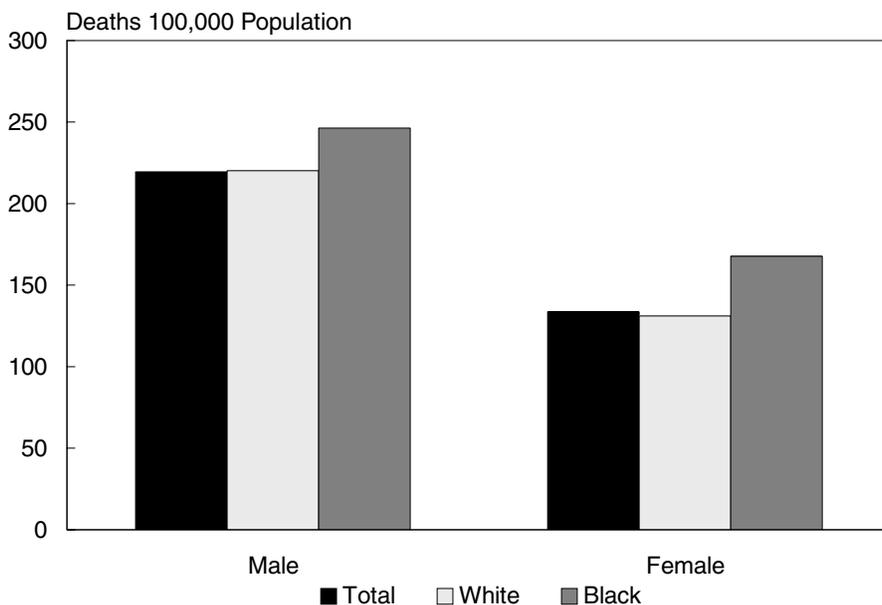


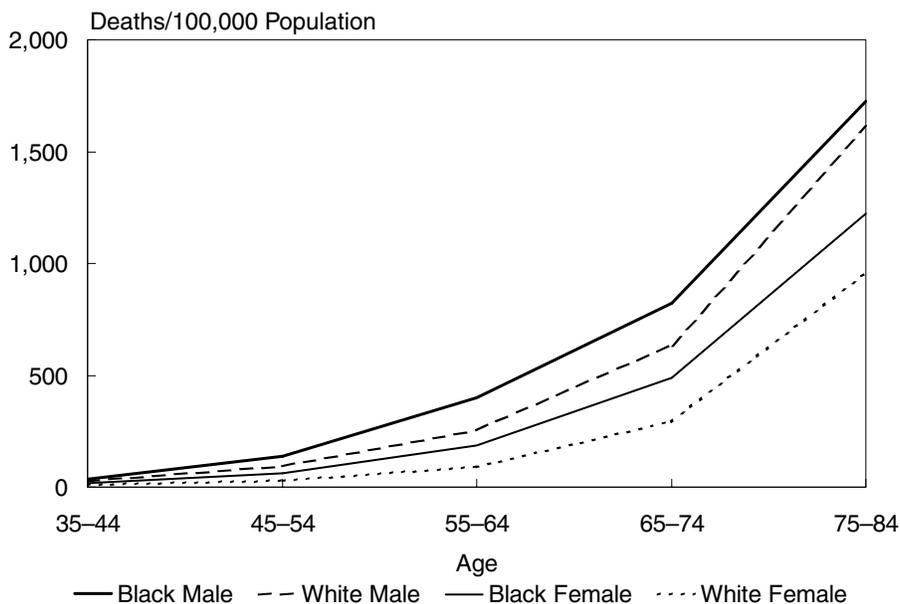
Chart 3-28
Age-Adjusted Death Rates for Coronary Heart Disease by Race and Sex, U.S., 2002

In 2002, CHD mortality within sex groups was higher in blacks than in whites; it was considerably higher in males than in females.²⁸



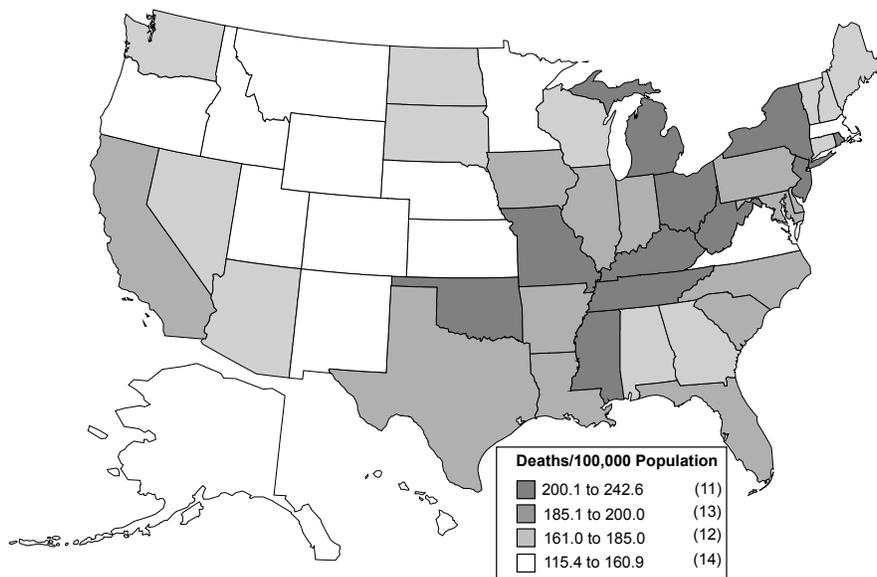
Coronary Heart Disease

Chart 3-29
Death Rates for Coronary Heart Disease
by Age, Race, and Sex, U.S., 2002



In 2002, CHD mortality within sex groups was higher in blacks than in whites for all age groups. Death rates were also higher in males than in females.²⁸

Chart 3-30
Age-Adjusted Death Rates for Coronary Heart Disease
by State, U.S., 1999-2000

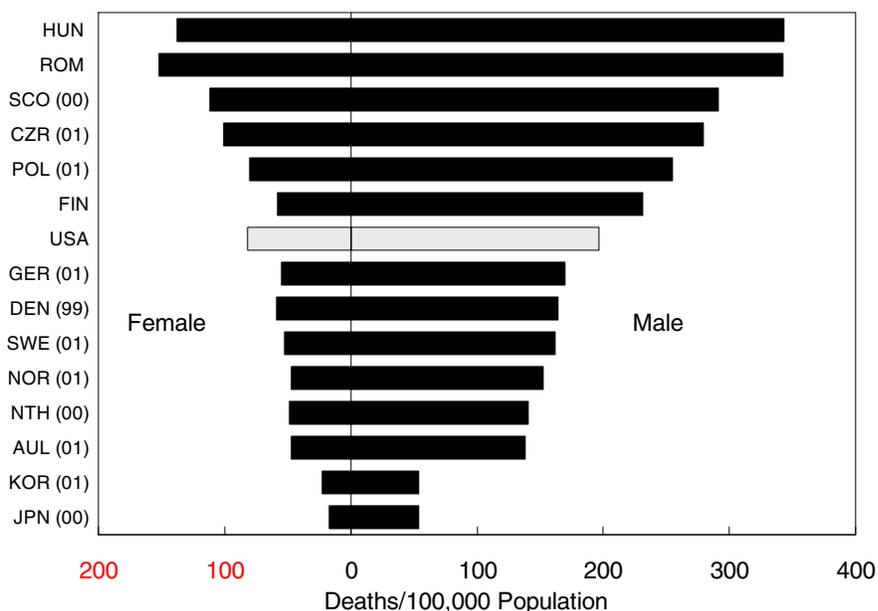


In 1999-2000, high CHD death rates were in a narrow band of States from New York through Appalachia to Oklahoma. Many western Mountain States had low rates.⁵

Coronary Heart Disease

Chart 3-31
Age-Adjusted Death Rates* for Coronary Heart Disease
by Country and Sex, Ages 35-74, 2002

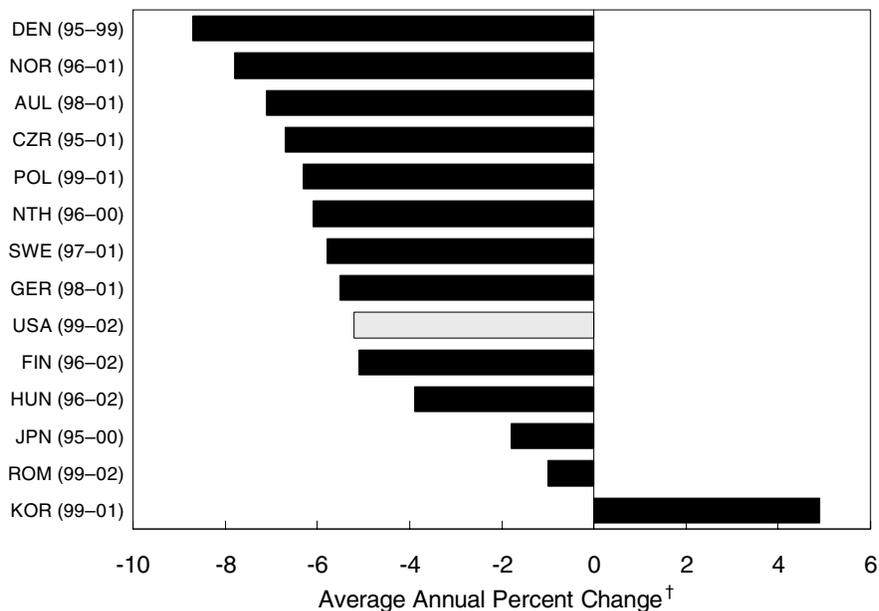
In 2002, among 15 industrialized countries, the United States ranked seventh highest for CHD mortality in males and fifth in females.³⁸



* Age-adjusted to European standard.
 Note: Data for 2002 unless otherwise indicated in parentheses.

Chart 3-32
Change in Age-Adjusted Death Rates* for Coronary Heart Disease
in Males by Country, Ages 35-74, 1995-2002

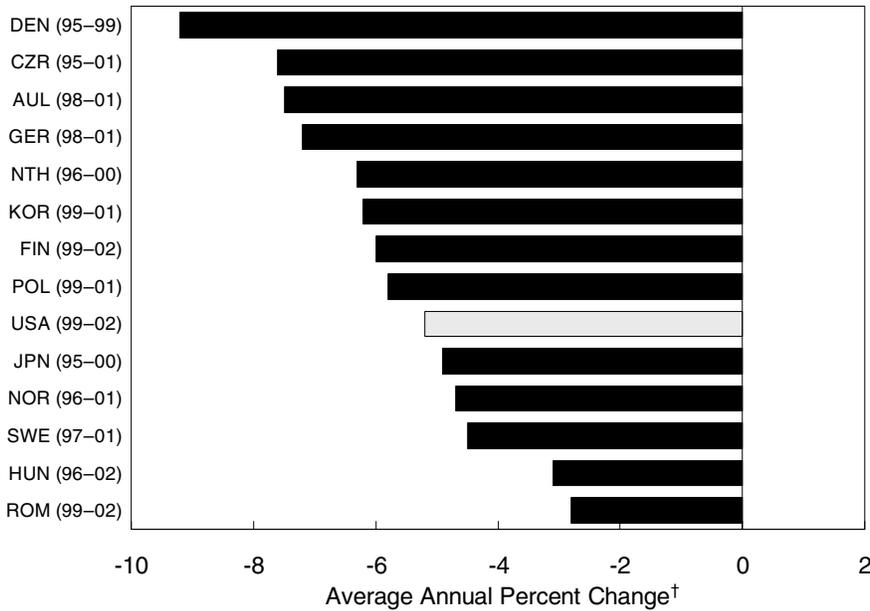
Between 1995 and 2002 (or latest data year), eight countries had a steeper decline in CHD mortality in males than the United States.³⁸



* Age-adjusted to the European standard. † Based on a log linear regression of the actual rates.
 Note: Data for years indicated in parentheses.

Coronary Heart Disease/Congestive Heart Failure

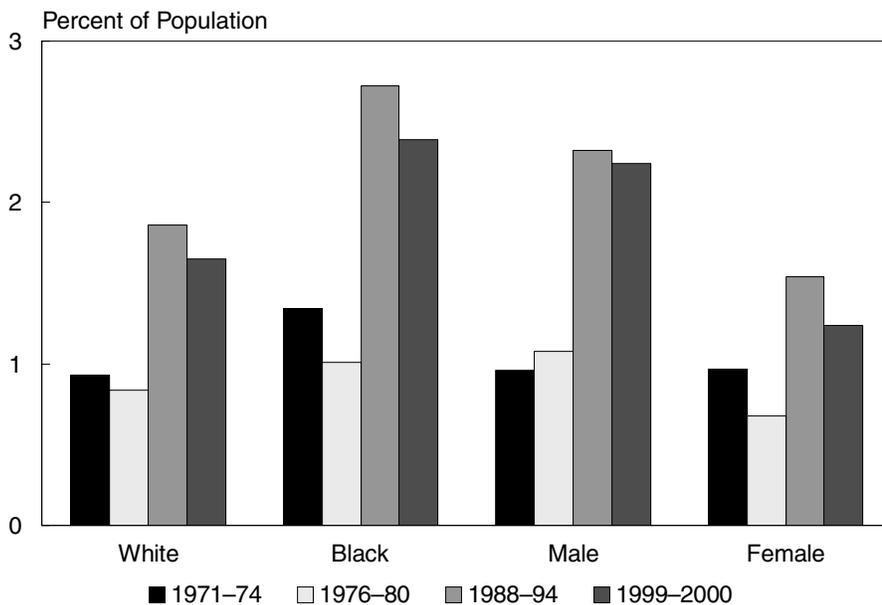
Chart 3–33
Change in Age-Adjusted Death Rates* for Coronary Heart Disease in Females by Country, Ages 35–74, 1995–2002



Between 1990 and 1999, eight countries had a steeper decline in CHD mortality in females than the United States.³⁸

* Age-adjusted to the European standard. † Based on a log linear regression of the actual rates.
 Note: The latest data years are indicated in parentheses.

Chart 3–34
Prevalence* of Congestive Heart Failure by Race and Sex, Ages 25–74, U.S., 1971–74 to 1999–2000



Between 1976–80 and 1988–94, the prevalence of CHF increased substantially in each group: male and female, black and white; it then declined in 1999–2000.¹⁷

* Age-adjusted.

Congestive Heart Failure

Chart 3-35
Hospitalization Rates for Congestive Heart Failure,
Ages 45-64 and 65 and Over, U.S., 1971-2002

Between 1971 and 2002, CHF hospitalization rates more than tripled for individuals aged 45-64 and ≥ 65 .²⁷

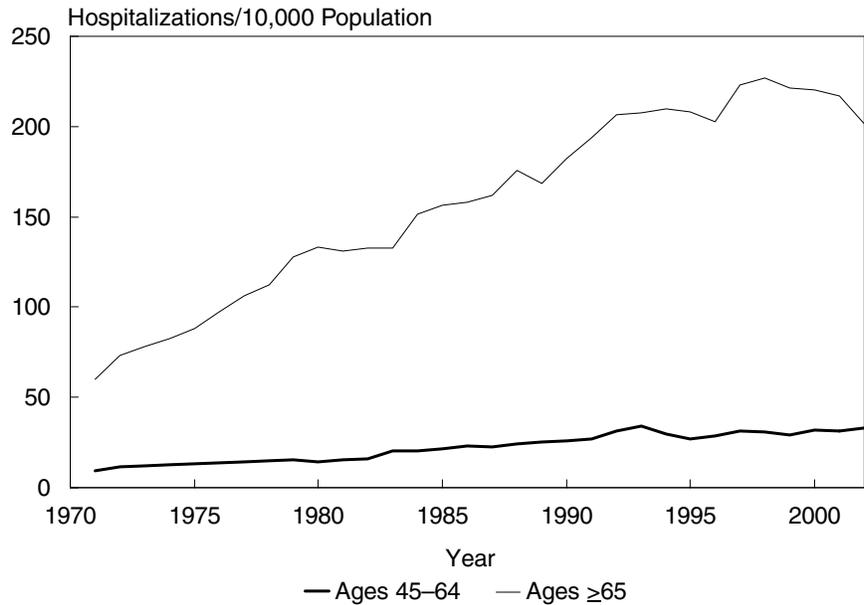
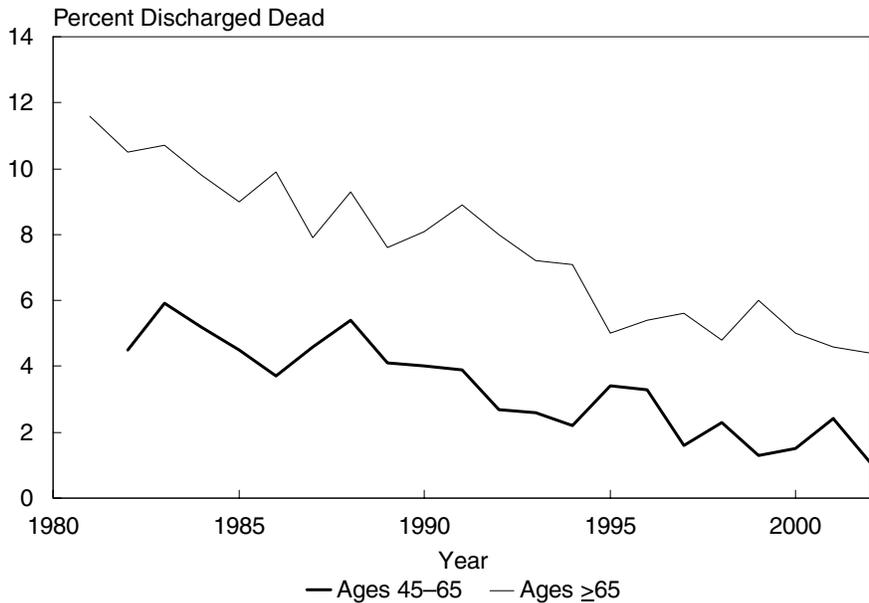


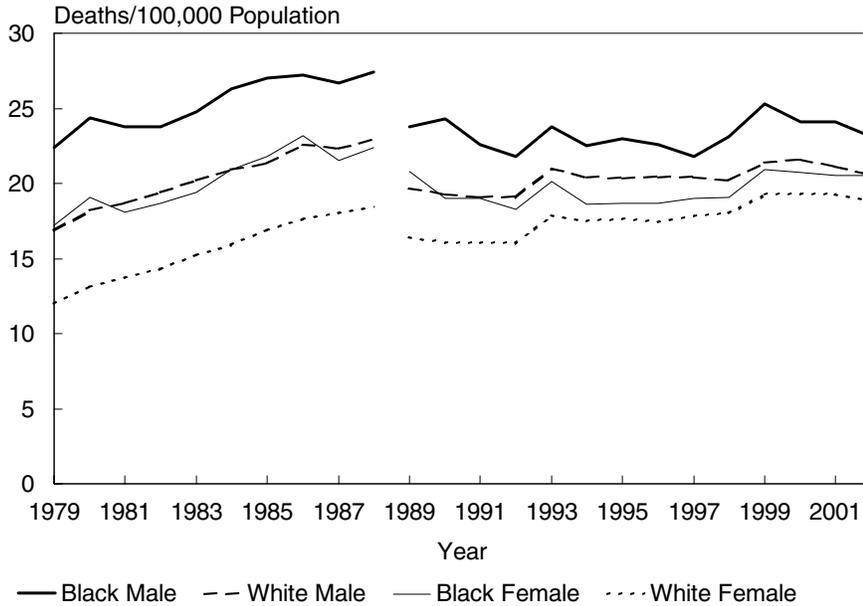
Chart 3-36
Hospital Case-Fatality Rates for Congestive Heart Failure,
Ages 45-64 and 65 and Over, U.S., 1981-2002

The percent of CHF hospital discharges that were discharged dead declined during the 1981-2002 period for individuals aged 45-65 and ≥ 65 .²⁷



Congestive Heart Failure

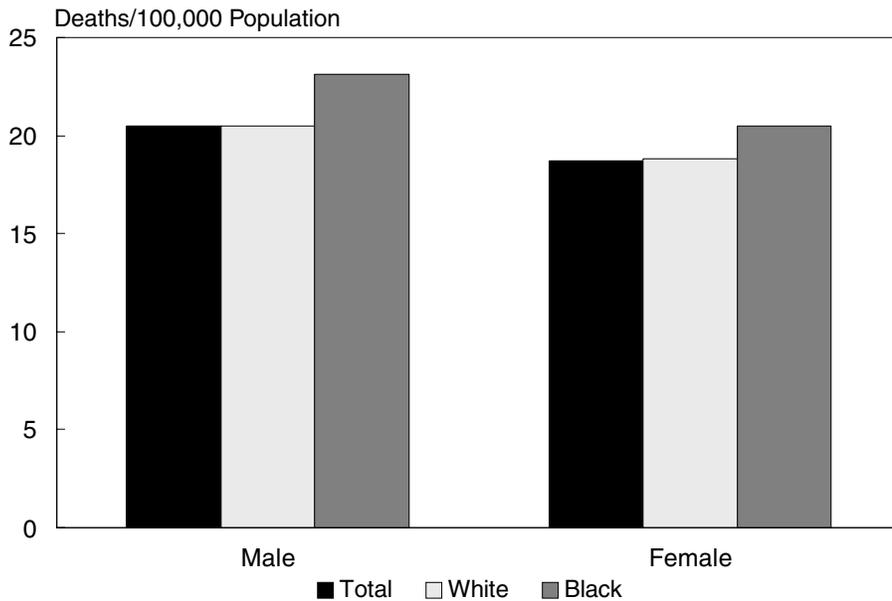
Chart 3-37
Age-Adjusted Death Rates for Heart Failure
by Race and Sex, U.S., 1979-2002



In the 1990s-2002, heart failure death rates for whites and blacks tended to level off after steady increases.^{5, 28}

Note: The break in the trend lines is intended to signal a discrepancy arising from the adoption of new cause-of-death coding instructions on death certificates in 1989.

Chart 3-38
Age-Adjusted Death Rates for Heart Failure
by Race and Sex, U.S., 2002



In 2002, death rates for heart failure within sex groups were slightly higher in blacks than in whites; they were slightly higher in males than in females.²⁸

Congestive Heart Failure

Chart 3-39
Death Rates for Heart Failure
by Age, Race, and Sex, U.S., 2002

In 2002, heart failure mortality within sex groups was higher in blacks than in whites at all ages. Within race groups, it was higher in males than in females.²⁸

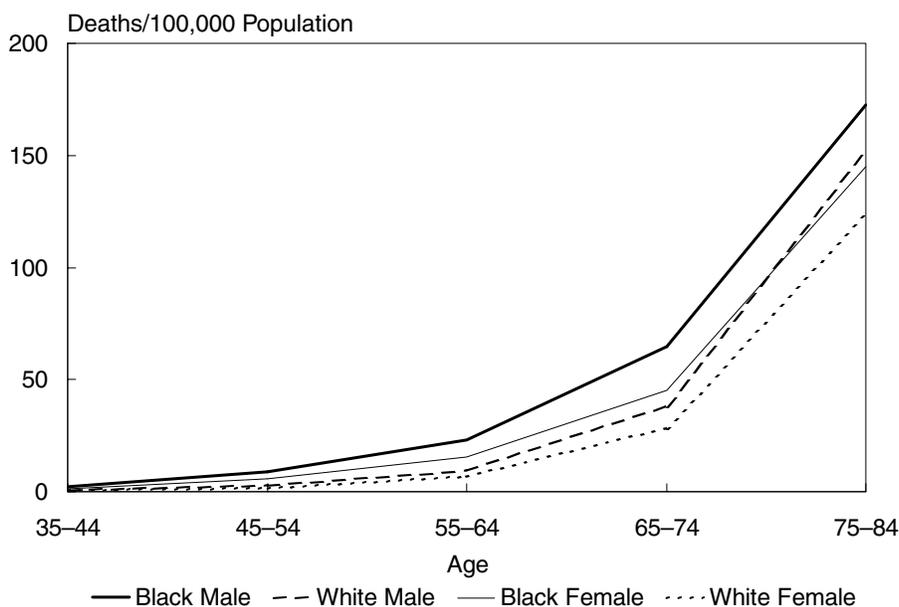
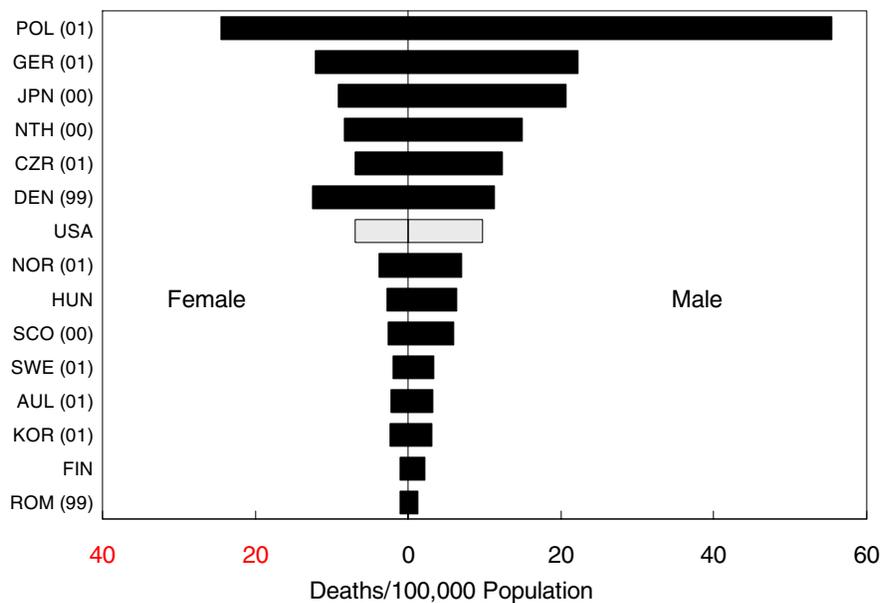


Chart 3-40
Age-Adjusted Death Rates* for Heart Failure
by Country and Sex, Ages 35-74, 2002

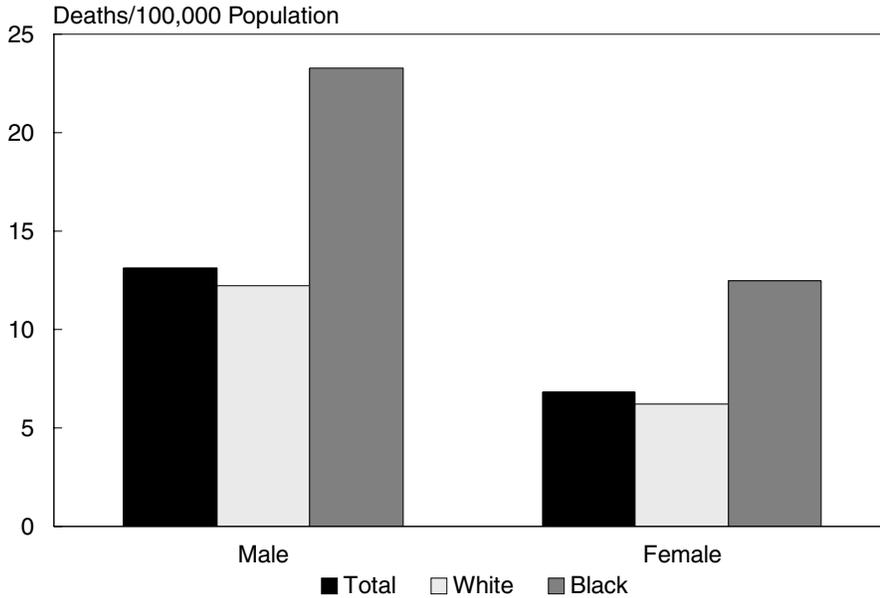
In 2002, the United States ranked seventh highest for heart failure mortality in males and in females.³⁸



* Age-adjusted to European standard.
 Note: Data for 2002 unless otherwise indicated in parentheses.

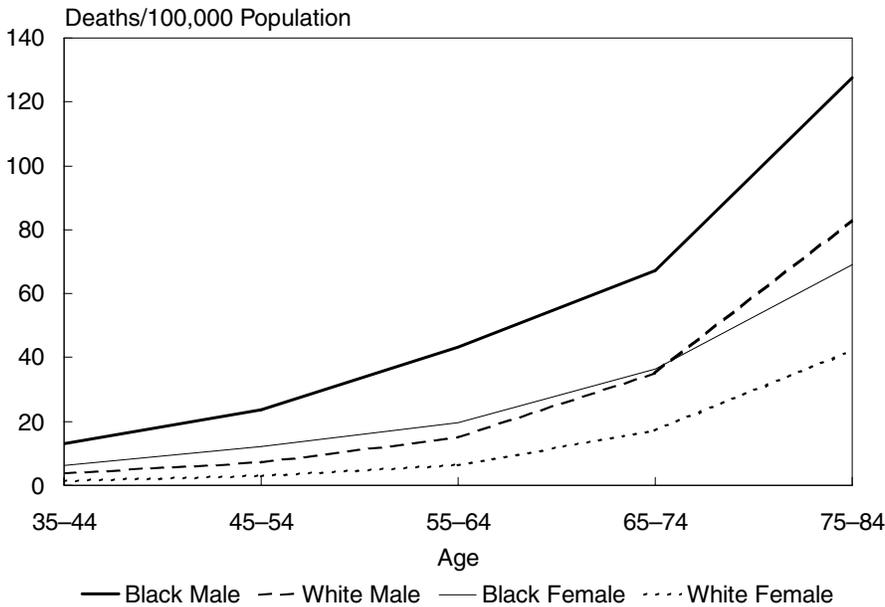
Cardiomyopathy

Chart 3-41
Age-Adjusted Death Rates for Cardiomyopathy
by Race and Sex, U.S., 2001



In 2001, the cardiomyopathy death rate was approximately twice as high in blacks as in whites. It was also approximately twice as high in males as in females.²⁸

Chart 3-42
Death Rates for Cardiomyopathy
by Age, Race, and Sex, U.S., 2001



In 2001, within sex groups, cardiomyopathy mortality was higher in blacks than in whites at each age; within race groups, it was higher in males than in females.²⁸

Atrial Fibrillation

Chart 3-43
Hospitalizations for Atrial Fibrillation,
U.S., 1982-2002

Between 1982 and 2002, hospitalizations with atrial fibrillation as a primary or secondary diagnosis increased significantly.²⁷

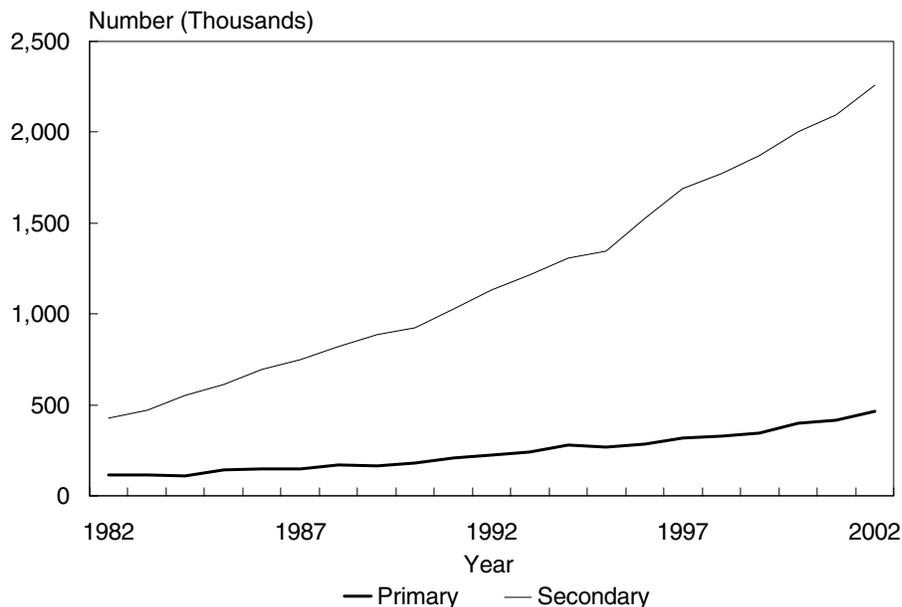
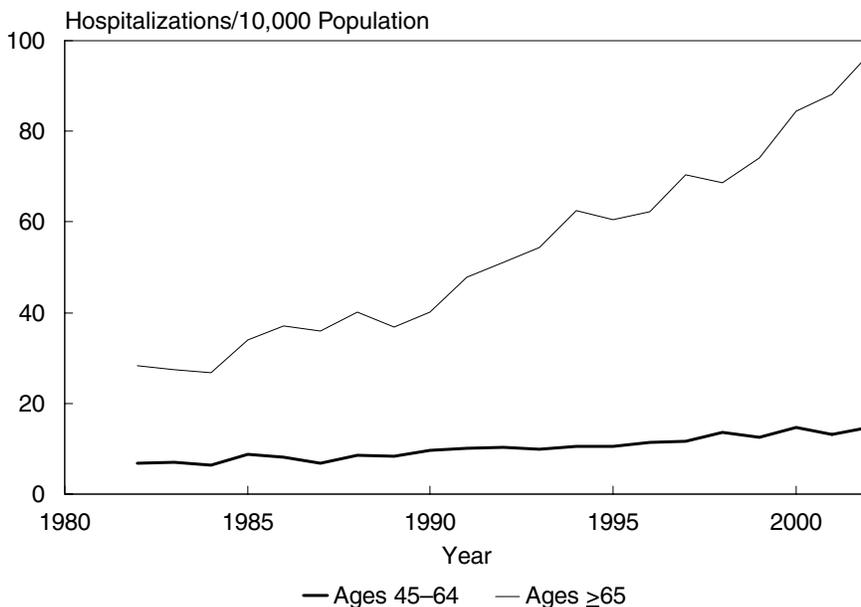


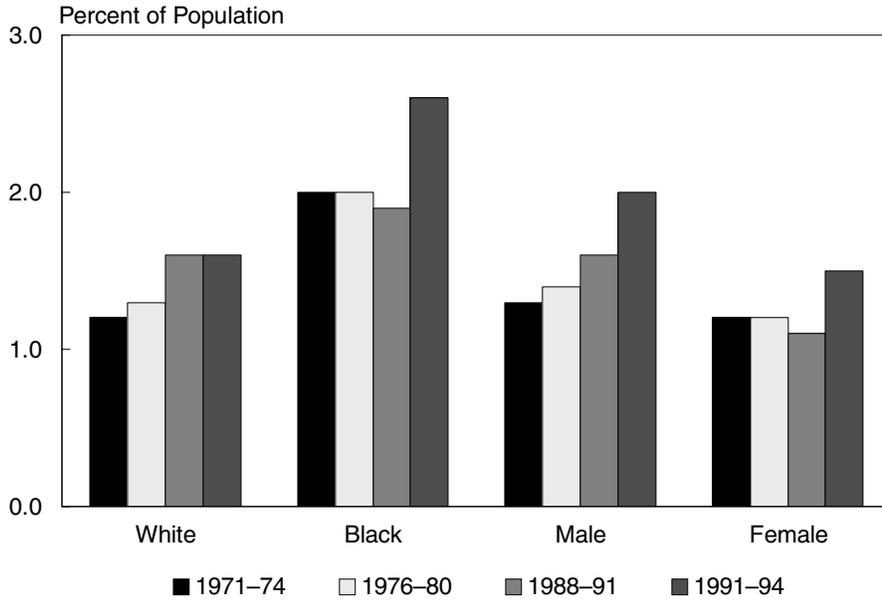
Chart 3-44
Hospitalization Rates for Atrial Fibrillation
by Age, U.S., 1982-2002

Between 1982 and 2002, the hospitalization rate for atrial fibrillation in patients aged 45-65 doubled; it more than tripled for those aged ≥ 65 .²⁷



Cerebrovascular Diseases (Stroke)

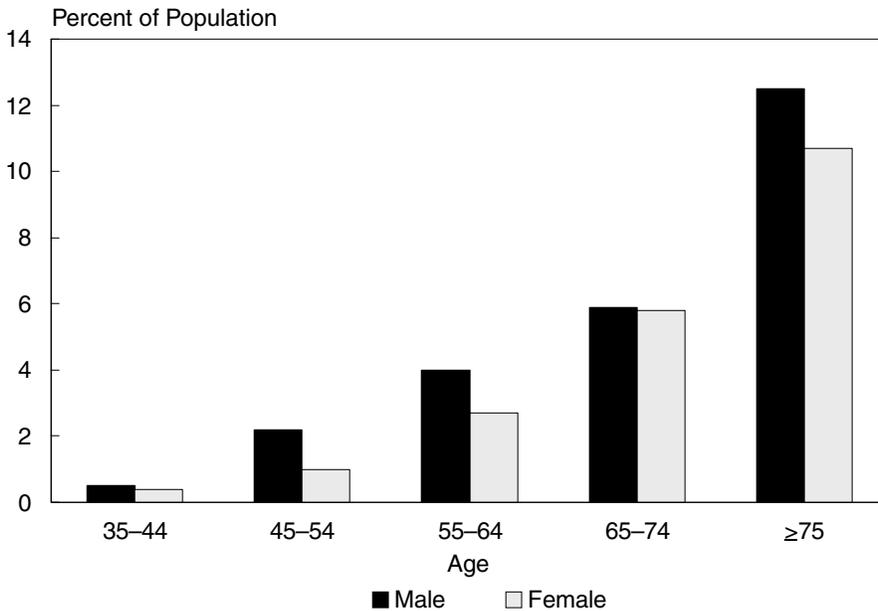
Chart 3-45
Prevalence of Stroke by Race and Sex,
Ages 25-74, U.S., 1971-74 to 1991-94



Between 1971-74 and 1991-94, the prevalence of stroke increased in males and females and in blacks and whites.¹⁷

* Age-adjusted.

Chart 3-46
Prevalence of Stroke by Age and Sex,
U.S., 1988-94



In 1988-94, the prevalence of stroke was higher in males than in females at all ages.¹⁷

Cerebrovascular Diseases (Stroke)

Chart 3-47
Prevalence of Stroke by Age and Race,
U.S., 1988-94

In 1988-94, the prevalence of stroke was higher in blacks than in whites at all ages.¹⁷

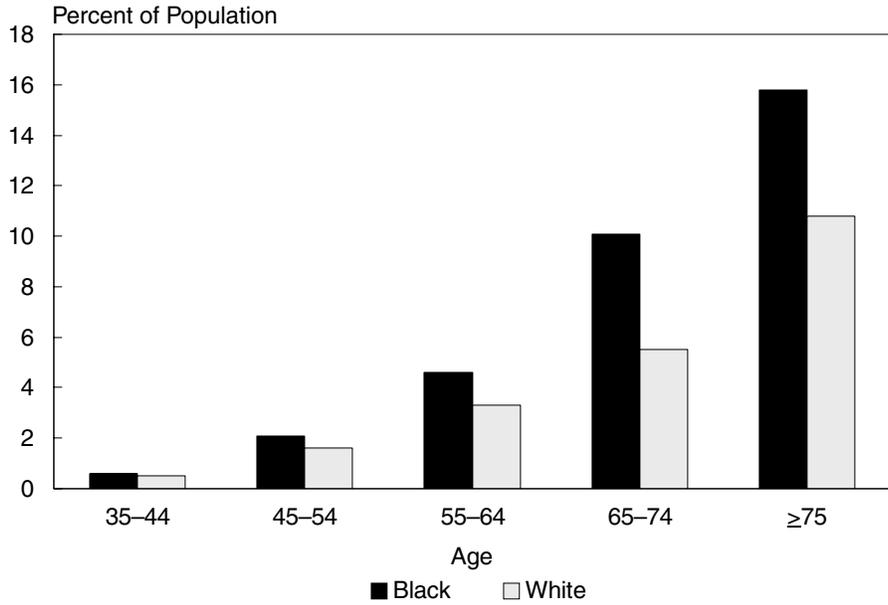
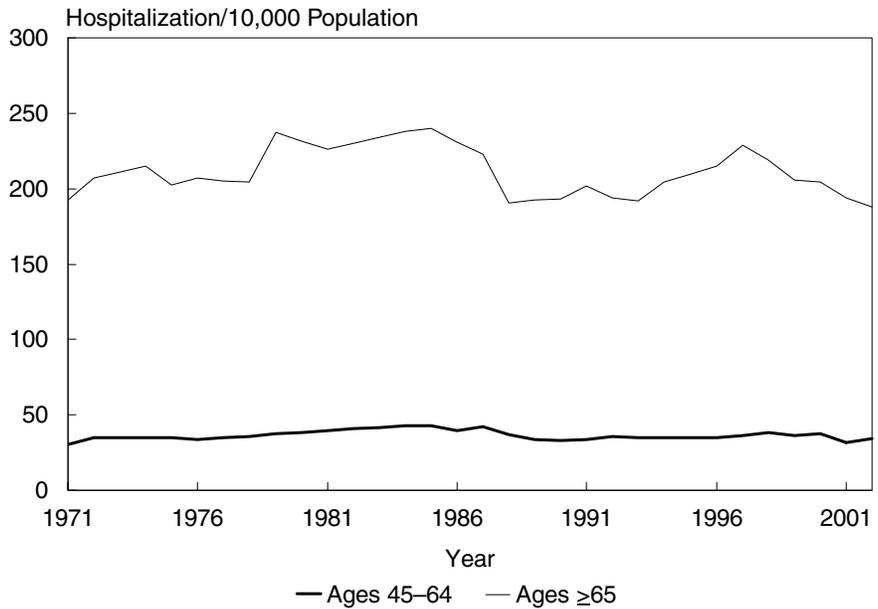


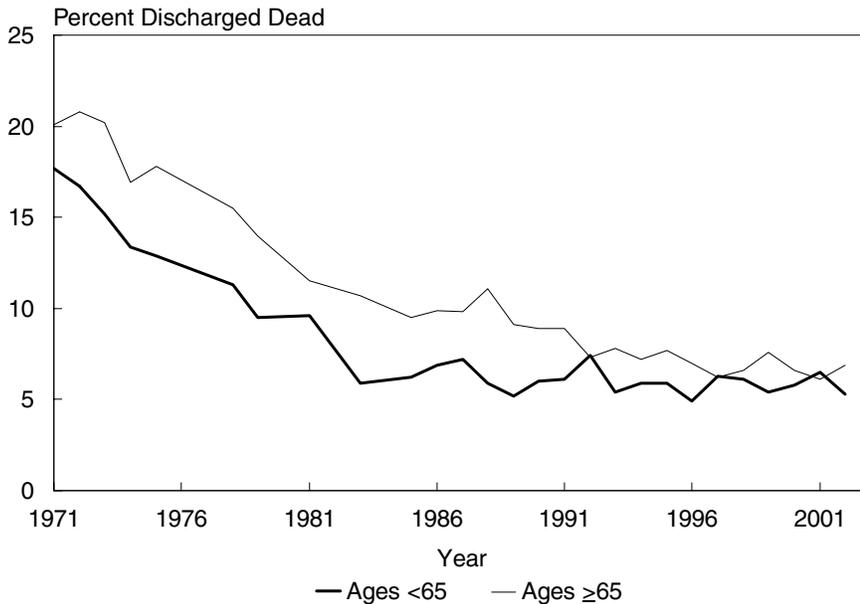
Chart 3-48
Hospitalization Rates for Stroke, Ages 45-64 and 65 and Over,
U.S., 1971-2002

Hospitalization rates for stroke in patients aged 45-64 and ≥65 increased between 1971 and the mid-1980s; no clear trend followed to 2002.²⁷



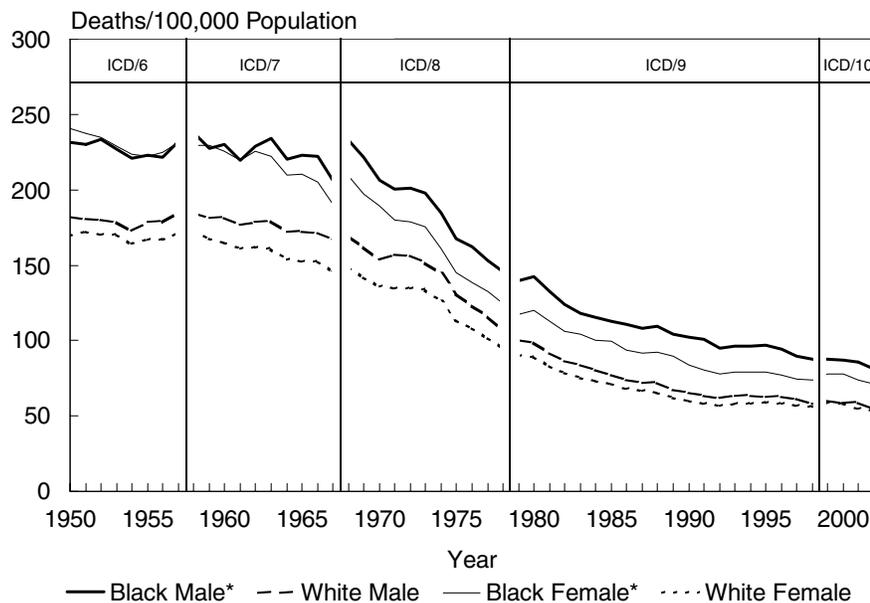
Cerebrovascular Diseases (Stroke)

Chart 3-49
Hospital Case-Fatality Rate for Stroke, Ages Under 65 and 65 and Over, U.S., 1971-2002



Hospital case-fatality rates for stroke in both groups declined appreciably between 1971 and the mid-1980s and modestly thereafter.²⁷

Chart 3-50
Age-Adjusted Death Rates for Stroke by Race and Sex, U.S., 1950-2002



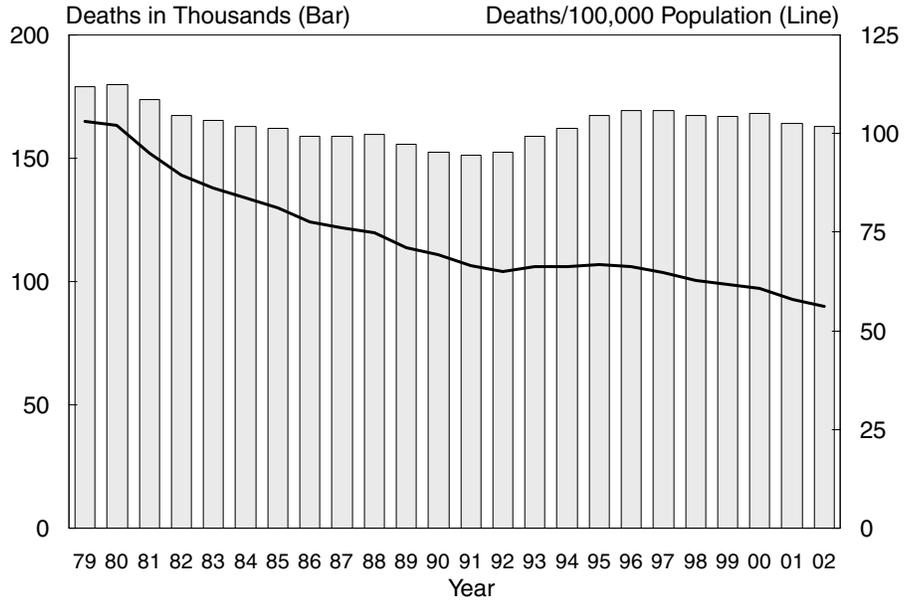
The steep decline in stroke mortality that occurred for all four groups in the 1970s slowed in the 1980s and 1990s. Declines resumed between 1999 and 2002.^{5-6, 28}

* Nonwhite from 1950 to 1967.

Cerebrovascular Diseases (Stroke)

Chart 3-51
Deaths and Age-Adjusted Death Rates for Stroke,
U.S., 1979-2002

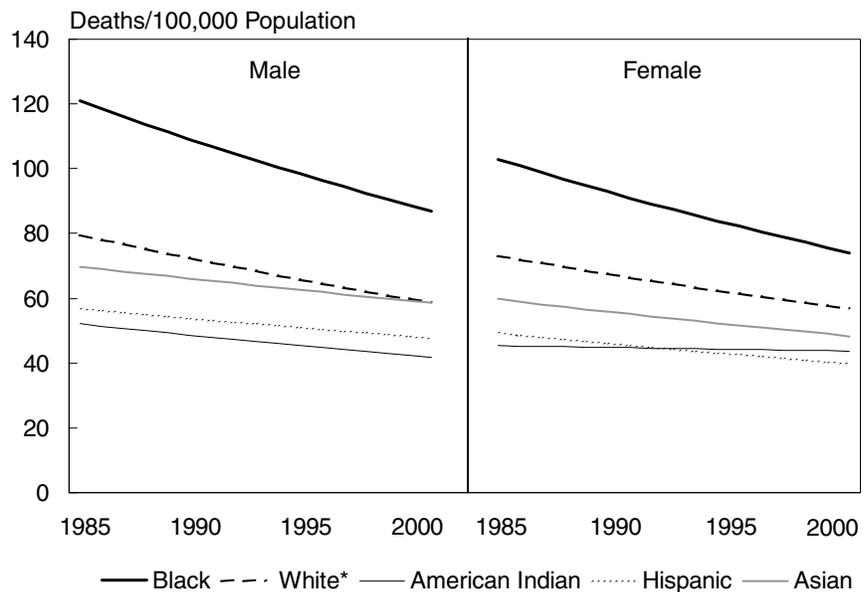
Between 1979 and the early 1990s, the number of deaths and the age-adjusted death rates for stroke declined. The number of deaths remained relatively stable after the mid-1990s, while the adjusted rates continued to drop.^{5, 25-26}



Note: The comparability ratio 1.0588 was applied to the deaths and rates reported in vital statistics for 1979-98.

Chart 3-52
Age-Adjusted Death Rates for Stroke
by Race/Ethnicity and Sex, U.S., 1985-2001

Between 1985 and 2001, stroke mortality declined for all groups. The decrease was modest among Hispanic and Asian males and American Indian females.²⁹



* Non-Hispanic.

Note: Each line is a log linear regression derived from the actual rates. The comparability ratio 1.0588 was applied to rates reported in vital statistics for 1985-98.

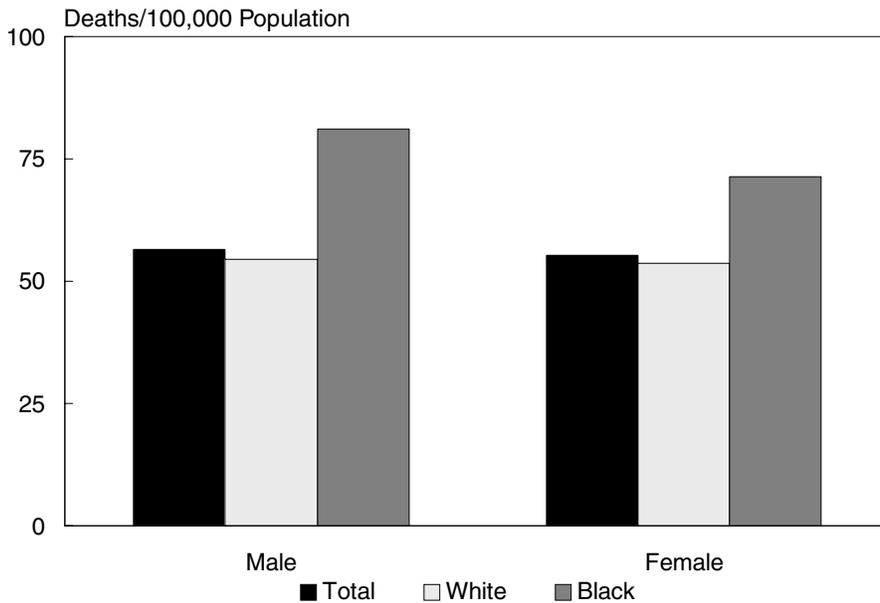
Cerebrovascular Diseases (Stroke)

Chart 3–53
Average Annual Percent Change in Age-Adjusted Death Rates
for Stroke by Race and Sex, U.S., 1960–2002

Period	Total Population	White Male	White Female	Black Male	Black Female
1960–1965	-1.3	-1.0	-1.5	-0.4	-1.4
1965–1970	-2.2	-2.0	-2.2	-0.8	-1.5
1970–1975	-3.2	-3.0	-3.1	-3.6	-4.7
1975–1980	-5.2	-5.8	-5.0	-3.7	-4.2
1980–1985	-4.4	-4.6	-4.4	-4.5	-3.6
1985–1990	-3.0	-3.1	-3.1	-1.9	-2.7
1990–1995	-0.5	-0.5	-0.4	-1.1	-1.0
1995–1998	-2.1	-1.5	-0.1	-2.2	-0.2
1999–2002	-3.2	-3.3	-3.3	-2.4	-3.3

The steep declines in stroke mortality that occurred in males and females and in whites and blacks during the 1970s and 1980s were followed by modest changes from 1990 to 1995 and appreciable declines from 1999 to 2002.^{5–6, 28}

Chart 3–54
Age-Adjusted Death Rates for Stroke
by Race and Sex, U.S., 2002



In 2002, stroke mortality was appreciably higher in blacks than in whites and about the same in males and females.²⁸

Cerebrovascular Diseases (Stroke)

Chart 3-55
Death Rates for Stroke by Age, Race, and Sex,
U.S., 2002

In 2002, stroke mortality was higher in blacks than in whites at all ages. Within race groups, it was higher in males than in females.²⁸

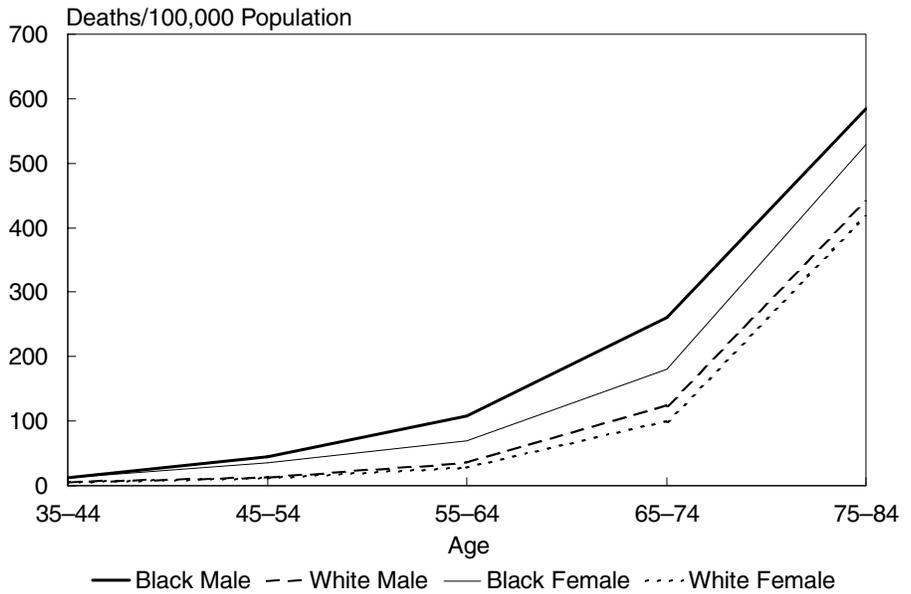
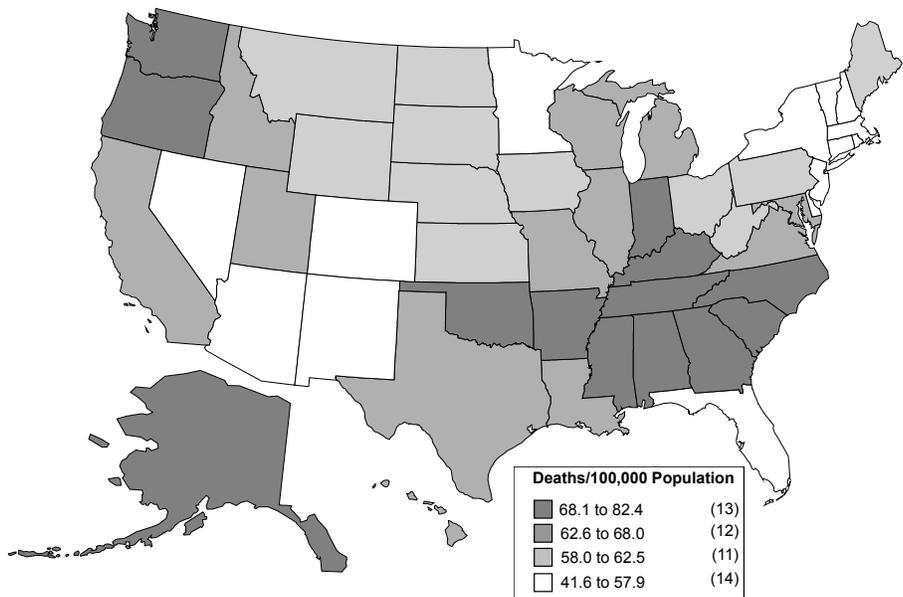


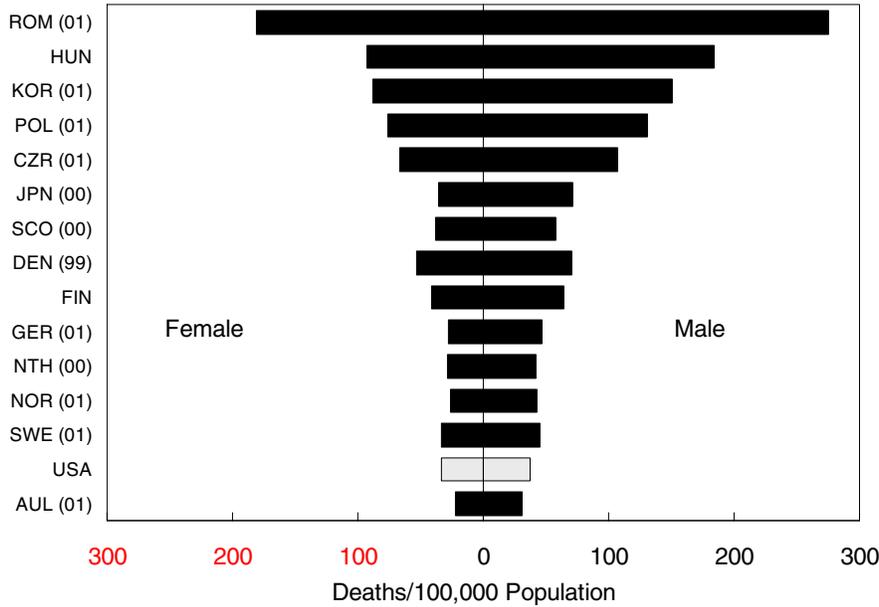
Chart 3-56
Age-Adjusted Death Rates for Stroke by State,
U.S., 1999-2000

In 1999-2000, stroke mortality was highest in many of the southeastern States, most of which comprise “the stroke belt”; Indiana; and the northern Pacific States.⁵



Cerebrovascular Diseases (Stroke)

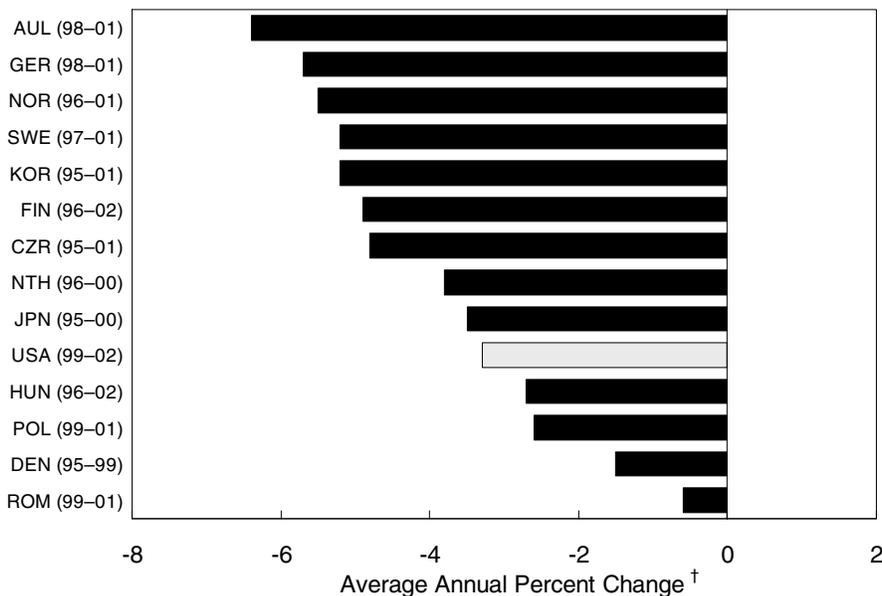
Chart 3-57
Age-Adjusted Death Rates* for Stroke
by Country and Sex, Ages 35-74, 2002



In 2002, among 15 industrialized countries, the United States had one of the lowest death rates for stroke. Eastern European countries and Korea had markedly higher rates compared with other countries.³⁸

* Age-adjusted to the European standard.
 Note: Data for 2002 unless otherwise indicated in parentheses.

Chart 3-58
Change in Age-Adjusted Death Rates* for Stroke
in Males by Country, Ages 35-74, 1995-2002



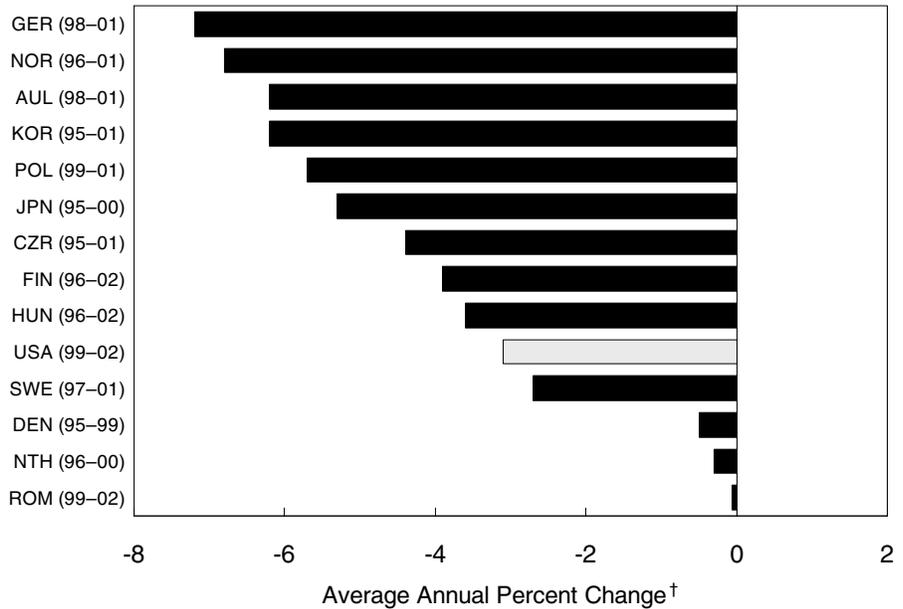
Between 1995 and 2002, nine countries had greater percent declines in stroke mortality for males than the United States.³⁸

* Age-adjusted to the European standard. † Based on a log linear regression of the actual rates.
 Note: Data for years indicated in parentheses.

Cerebrovascular Diseases (Stroke)/Hypertension

Chart 3-59
Change in Age-Adjusted Death Rates* for Stroke
in Females by Country, Ages 35-74, 1995-2002

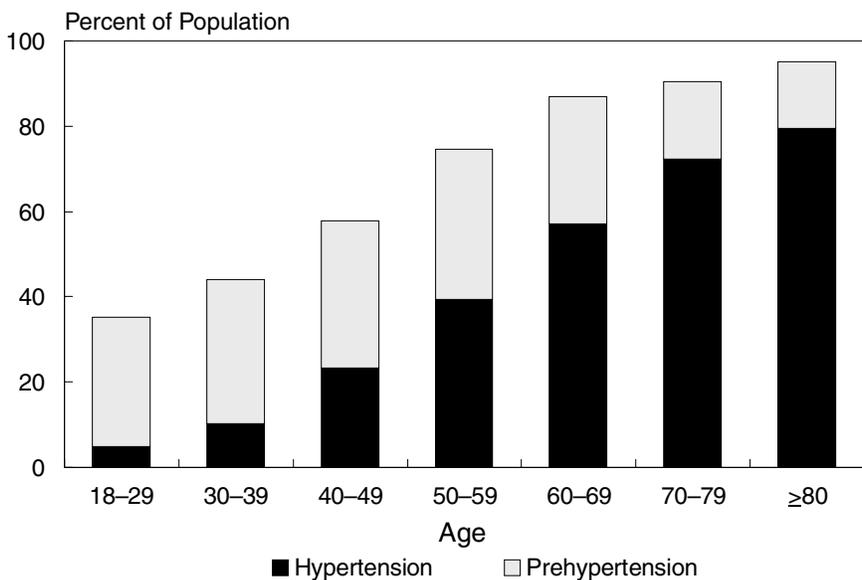
Between 1995 and 2002, nine countries had greater percent declines in stroke mortality for females than the United States.³⁸



* Age-adjusted to the European standard. † Based on a log linear regression of the actual rates.
 Note: Data for years indicated in parentheses.

Chart 3-60
Prevalence of Hypertension and Prehypertension
by Age, U.S., 1999-2000

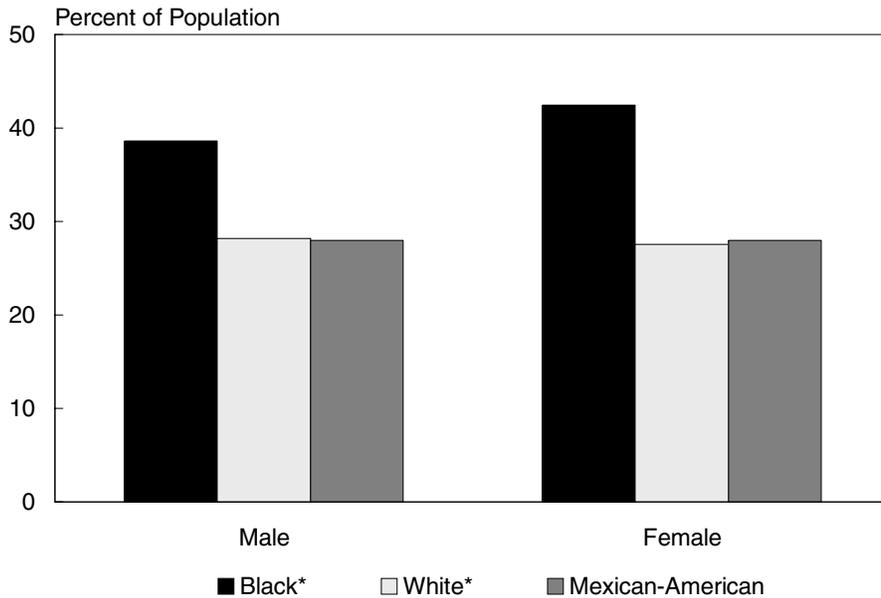
In 1999-2000, the prevalence of hypertension was 39% at ages 50-59 and 79% at ages ≥ 80 . The prevalence of prehypertension was 30-35% for ages 18-69.¹⁷



Note: Hypertension is defined as systolic BP 140+ mmHg, or 90+ diastolic BP, or on medication. Prehypertension is defined as BP 120-139/80-89 mmHg.

Hypertension

Chart 3–61
Prevalence of Hypertension by Race/Ethnicity and Sex,
Ages 20–74, U.S., 1999–2000

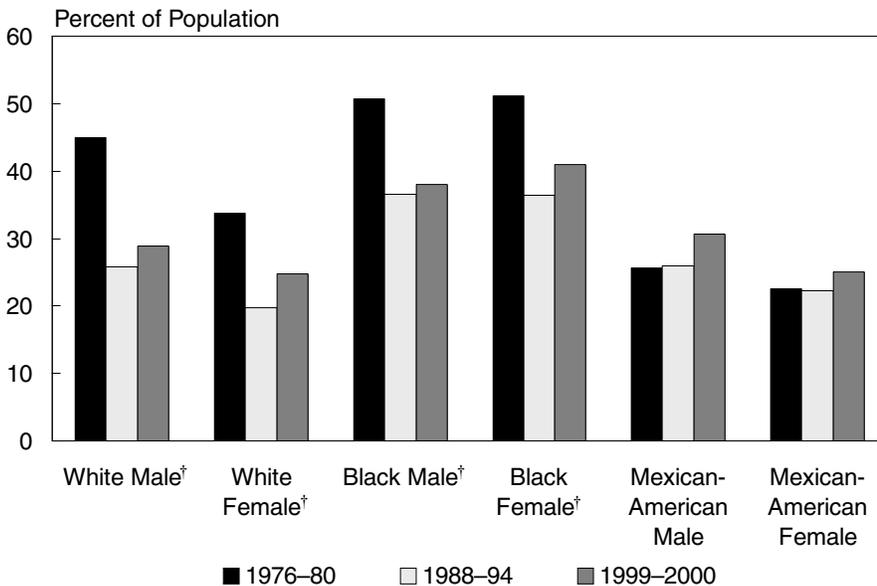


In 1999–2000, the prevalence of hypertension at ages 20–74 was appreciably higher in blacks than in whites or Mexican-Americans. Within race groups, it was similar for males and females.²⁹

* Non-Hispanic.

Note: Hypertension is defined as systolic BP 140+ mmHg, or 90+ diastolic BP, or on medication.

Chart 3–62
Prevalence* of Hypertension by Race/Ethnicity and Sex,
Ages 20–74, U.S., 1976–80 to 1999–2000



The prevalence of hypertension was appreciably lower in 1988–94 compared with earlier years for white and black males and females but not for Mexican-Americans, who had the lowest prevalence.¹⁷

* Age-adjusted.

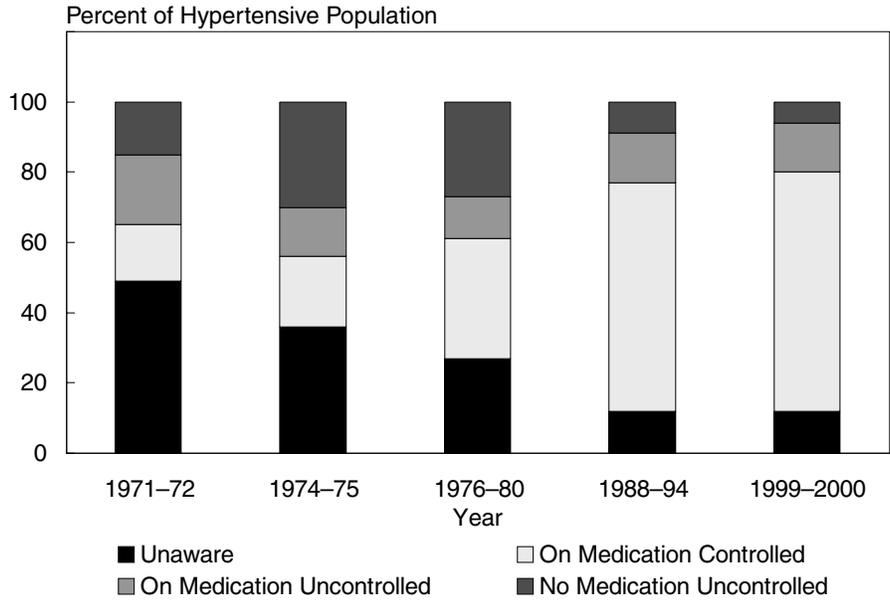
† Non-Hispanic.

Note: Hypertension is defined as systolic BP 140+ mmHg, or 90+ diastolic BP, or on medication.

Hypertension

Chart 3-63
Hypertensive Population Aware, Treated, and Controlled,
Ages 18-74, U.S., 1971-72 to 1999-2000

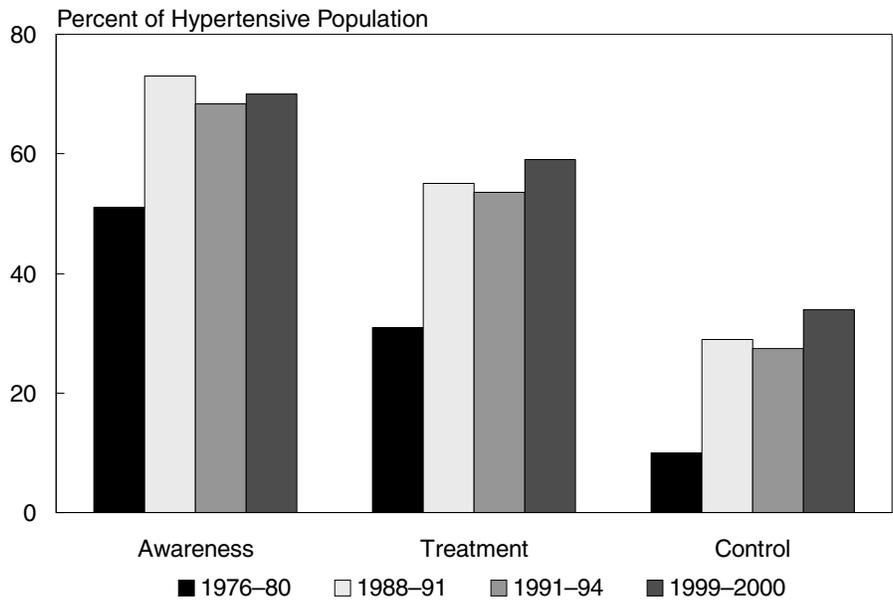
Eighty-eight percent of persons with a high level of hypertension were aware of their condition in 1999-2000 compared with 51% in 1971-72. The percent of hypertensive persons treated and controlled increased from 16% in 1971-72 to 68% in 1999-2000.¹⁷



Note: Hypertension is defined as systolic BP 160+ mmHg, or 95+ diastolic BP, or on medication.

Chart 3-64
Hypertensive Population Aware, Treated, and Controlled,
Ages 18-74, U.S., 1976-80 to 1999-2000

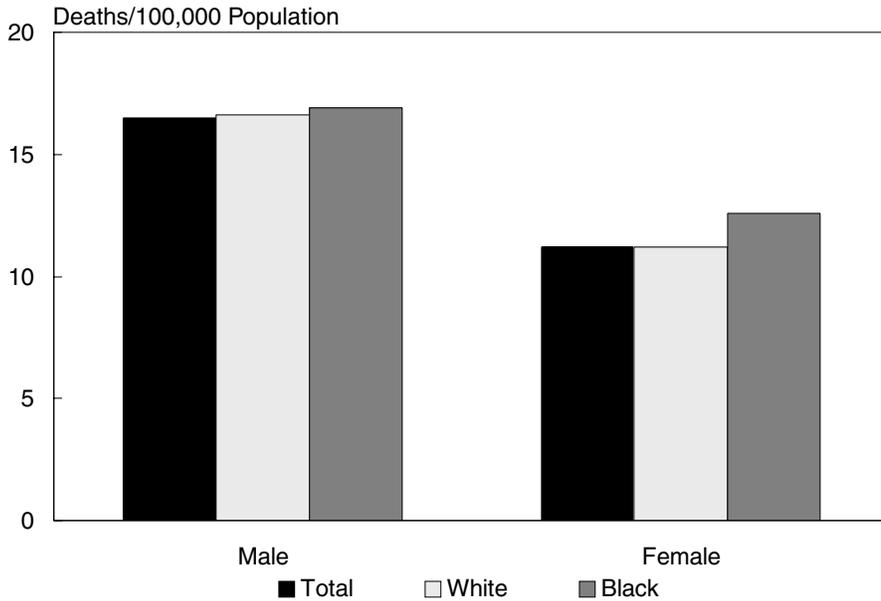
In 1988-91, 73% of hypertensive patients were aware of their condition, 55% were receiving treatment for it, and 29% had it controlled. Those percentages were appreciably greater than the comparable figures for the 1976-80 period and increased modestly for the treatment and control groups in 1999-2000.³⁹



Note: Hypertension is defined as systolic BP 140+ mmHg, or 90+ diastolic BP, or on medication.

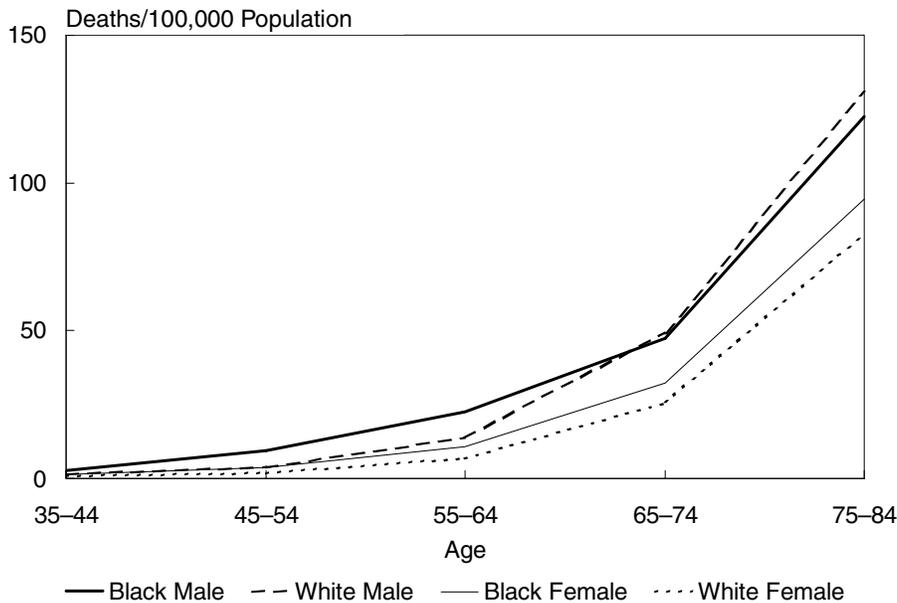
Diseases of Arteries

Chart 3-65
Age-Adjusted Death Rates for Diseases of Arteries
by Race and Sex, U.S., 2002



In 2002, death rates for diseases of arteries were higher in males than in females, and about the same in blacks as in whites.²⁸

Chart 3-66
Death Rates for Diseases of Arteries
by Age, Race, and Sex, U.S., 2002



In 2002, death rates for diseases of arteries within race groups were higher in males than in females at all ages. For females, they were higher in blacks than in whites at all ages, but only below age 65 were they higher in black males than in white males.²⁸

Congenital Anomalies of the Circulatory System

Chart 3-67

Percent of Deaths From Congenital Malformations of the Circulatory System, Age Under 1, U.S., 1940-2000

The percentage of deaths from congenital anomalies of the circulatory system, age <1, declined from 82% in 1940 to 43% in 2000.⁵⁻⁶

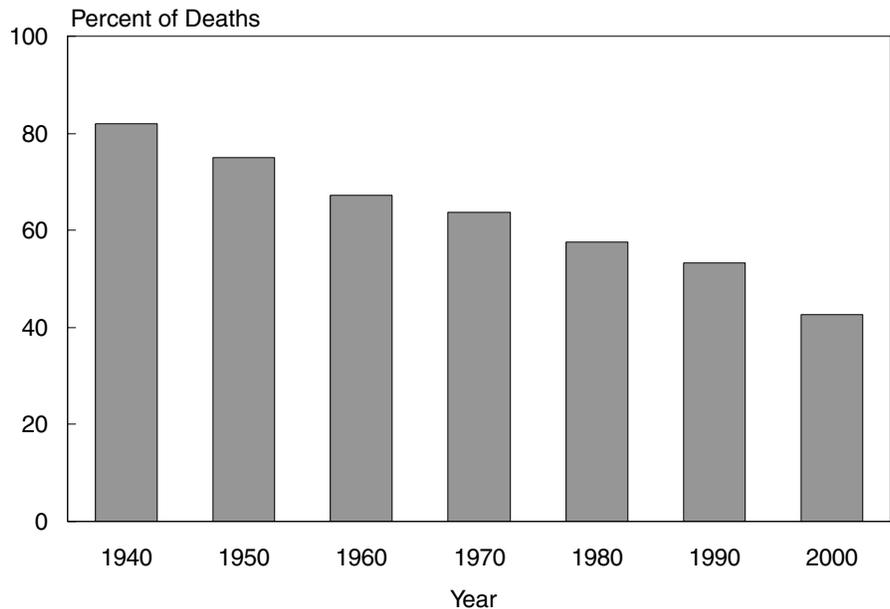
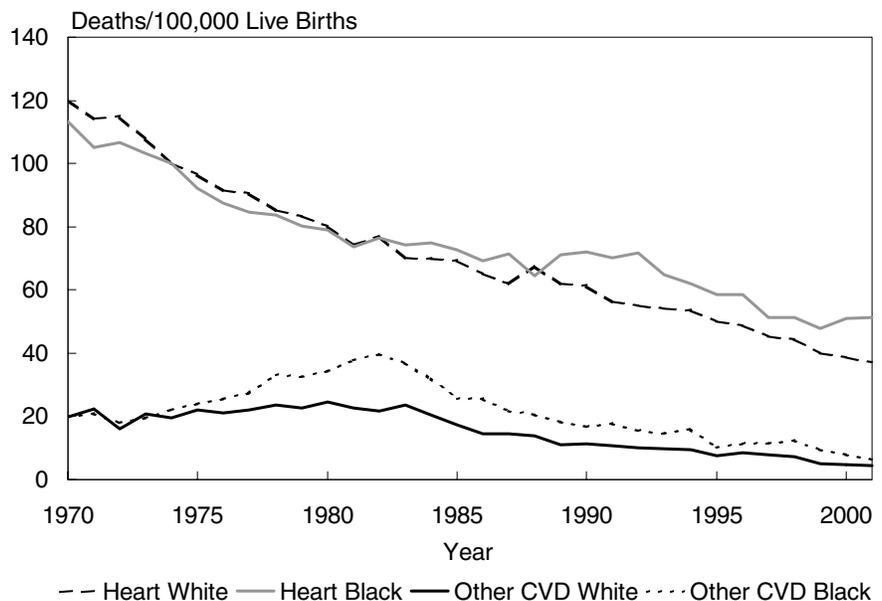


Chart 3-68

Infant Mortality From Congenital Malformations of the Circulatory System by Race, U.S., 1970-2001

Infant congenital heart disease mortality declined between 1970 and 2001 in blacks and in whites. For other congenital anomalies of the circulatory system, the trend has been downwards only since the early 1980s.^{5-6, 26}



4. Lung Diseases

The term *lung diseases* is used here to mean:

- Acute lower respiratory infections
- Chronic lower respiratory diseases
- Lung diseases due to external agents
- Adult respiratory distress syndrome
- Pulmonary edema
- Interstitial lung diseases
- Cardiopulmonary diseases
- Selected HIV-related and other pulmonary infections
- Neonatal pulmonary diseases.

Chart 4–1 shows the distribution of deaths in 2001 by major lung subgroups. Chart 4–2 contains a detailed list of lung diseases, their 9th revision ICD codes, 2002 estimates of hospital discharges and length of stay, 2001 estimates of physician office visits for the diagnostic codes, 10th revision ICD codes for lung diseases, and number of deaths in 2001 for those codes. Subsequent charts display morbidity and mortality for total lung diseases and specific subgroups—chronic bronchitis, emphysema, COPD, asthma, neonatal respiratory distress syndrome (RDS), and sudden infant death syndrome (SIDS).

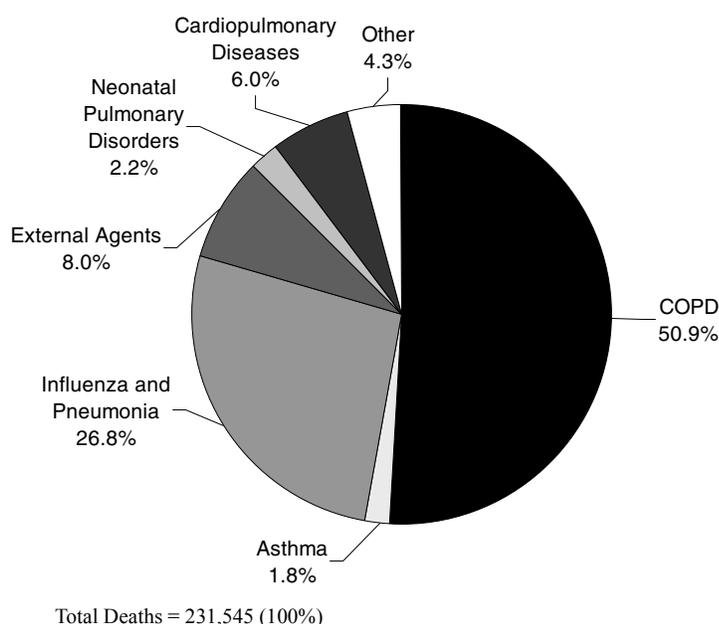
Chronic Obstructive Pulmonary Disease

The term *COPD* includes chronic bronchitis and emphysema. In 1997, the survey used to determine the prevalence of chronic bronchitis and emphysema in the United States changed. Prior to 1997, prevalence was based on individuals who had, or knew someone in the family who had, chronic bronchitis or emphysema during the past 12 months. The new survey asks, “During the past 12 months, have you been told by a doctor or other health professional that you have chronic bronchitis? Have you ever been told by a doctor or other health professional that you have emphysema?” As a result, the 1997 to 2002 estimates are not comparable to those based on the NHIS of 1996 and earlier. A break in the prevalence trend lines between 1996 and 1997 in Charts 4–5 and 4–7 is used to indicate the discontinuity.

Asthma

Three different prevalence estimates derived from NHIS data may be found in this chapter. Prior to 1997, prevalence was based on NHIS estimates of individuals who had, or knew someone in the family who had, asthma during the past 12 months. Beginning in 1997, “attack prevalence” was introduced to limit the count to individuals who responded *yes* to questions: “Have you ever been told by a doctor or other health professional that you have asthma?” and “During the past 12 months, have you had an episode of asthma or asthma attack?” As a result, the 1997 to 2002 estimates are not comparable to those based on the NHIS prior to 1997. A break in the asthma prevalence trend line between 1996 and 1997 shown in Chart 4–18 is used to indicate the change. In 2001, a question was added to the survey to determine “current prevalence” or simply, prevalence. It asks of those who have been told by a doctor or other health professional that they have asthma, “Do you still have it?” Current prevalence is based on individuals who respond *yes* to the question. (See Chart 4–19.)

Chart 4–1
Deaths From Lung Diseases, Percent by Subgroup, U.S., 2001



Lung Diseases

Chart 4–2
Number of Hospitalizations, Physician Office Visits,
and Deaths for Selected Lung Diseases, U.S., 2001 and 2002*

Diagnostic Category	ICD/9 Codes	Hospitalizations			ICD/10 Codes	Deaths
		First-Listed Discharge (1,000)	Length of Stay (Days)	Physician Office Visits (1,000)		
Total		3,356	5.9	48,374		231,545
Acute lower respiratory infections						
Influenza and pneumonia	480–487	1,337	5.7	4,493	J10–J18	62,034
Acute bronchitis	466	279	3.4	3,102	J20	201
Acute bronchiolitis	included in 466	0	0	0	J21	62
Chronic lower respiratory disease						
COPD	490–492, 494–496	673	5.2	13,841	J40–J44	117,773
Chronic bronchitis	490, 491	547	5.2	9,163	J40–J42	959
Emphysema	492	16	5.7	113	J43	16,242
Other COPD	495–496	101	4.9	4,404	J44	100,572
Bronchiectasis	494	9	5.9	161	J47	971
Asthma	493	484	3.2	11,280	J45	3,897
Status asthmaticus	included in 493	0			J46	372
Cystic fibrosis	277.0	12	9.3	20	E84	482
Lung disease due to external agents	500–508	189	8.3	44	J60–J70	18,524
Adult respiratory distress syndrome	518.5	0	0	0	J80	2,079
Pulmonary edema	518.4	0	0	0	J81	735
Interstitial lung diseases						
Sarcoidosis	135	7	5.6	292	D86	831
Respiratory tuberculosis	011, 012	6	14.7	0	A15, A16, A19, A31.0	836
Respiratory failure	518.8	193	9.5	759	J96	3,246
Pulmonary manifestations of connective tissue disorders	446.2, 446.4	0	0	0	J99, M31.0, M31.3	420
Cardiopulmonary diseases						
Pulmonary embolism	415.1	99	6.3	237	I26	8,627
Other pulmonary heart disease	415.2–417	22	3.3	236	I27	4,639
Selected HIV-related and other pulmonary infections	114–116, 117.3, 117.5, 117.7, 136.3	5	12.3	0	B38–40, B44–46, B59	701
Neonatal pulmonary disorders						
Respiratory distress syndrome	769	17	31.0	29	P22.0	912
Sudden infant death syndrome	798.0	0	0	0	R95	2,234
Congenital malformation of the lung	745.4, 745.5, 745.6	7	0	134	Q33	577
Bronchopulmonary dysplasia	770.7	0	0	0	P27.1	296
Atelectasis of newborn	770.4, 770.5	0	0	0	P28.0, P28.1	503
Other perinatal respiratory diseases	770.1–770.3, 770.6, 770.8, 770.9	32	7.8	66	P25, P26, P27.0, P27.8, P27.9, P28.2–P28.9	593

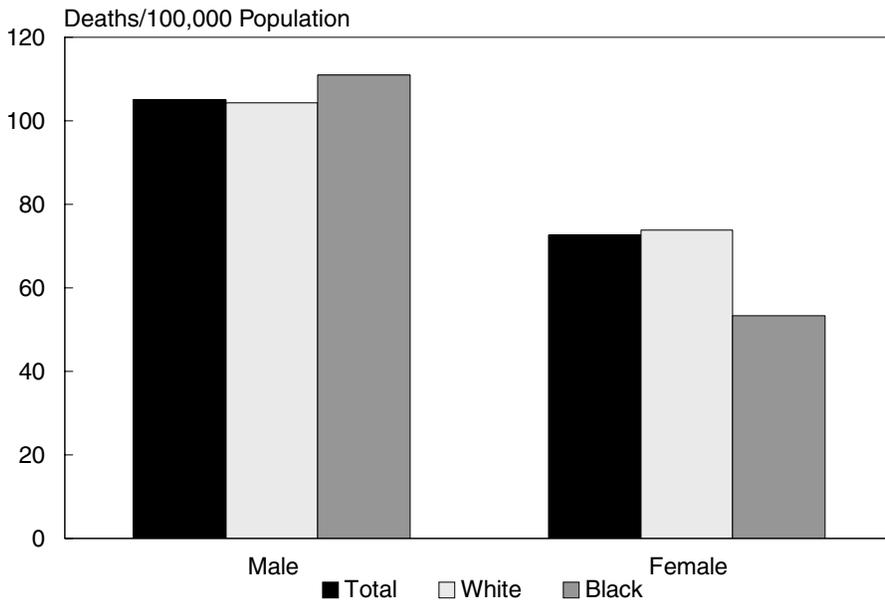
* 2002 for Hospitalizations and 2001 for Physician Office Visits and Deaths.

Note: Estimates of hospitalizations and physician office visits are subject to sampling variability. Estimates of hospitalizations 15,000 or below have a relative standard error of more than 16%. Estimates of physician office visits below 1 million have a relative standard error of more than 30%.

Compiled from references 27, 28, and 32.

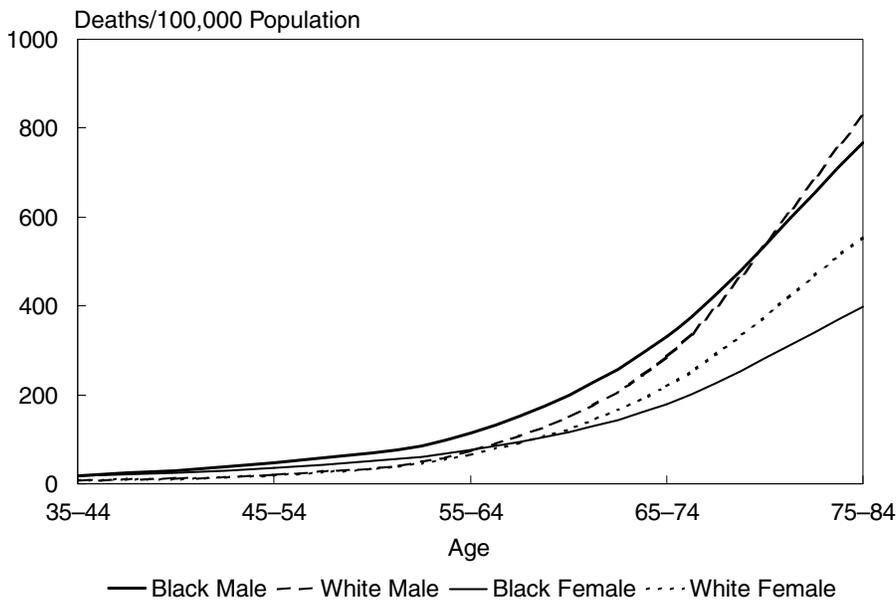
Lung Diseases

Chart 4-3
Age-Adjusted Death Rates for Total Lung Diseases
by Race and Sex, U.S., 2000



In 2000, total lung disease mortality (other than lung cancer) was higher in males than in females. Within sex groups, it was slightly higher in black males than in white males, but lower in black females than in white females.⁵

Chart 4-4
Death Rates for Total Lung Diseases
by Age, Race, and Sex, U.S., 2000

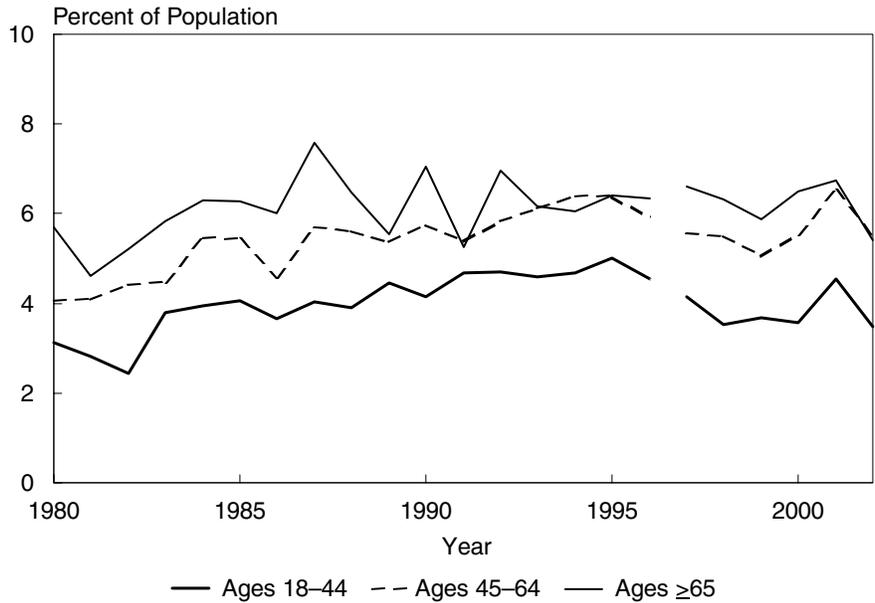


In 2000, the male–female gap in mortality from total lung diseases increased for blacks and whites with increasing age.⁵

Chronic Obstructive Pulmonary Disease

Chart 4-5
Prevalence of Chronic Bronchitis
by Age, U.S., 1980-2002

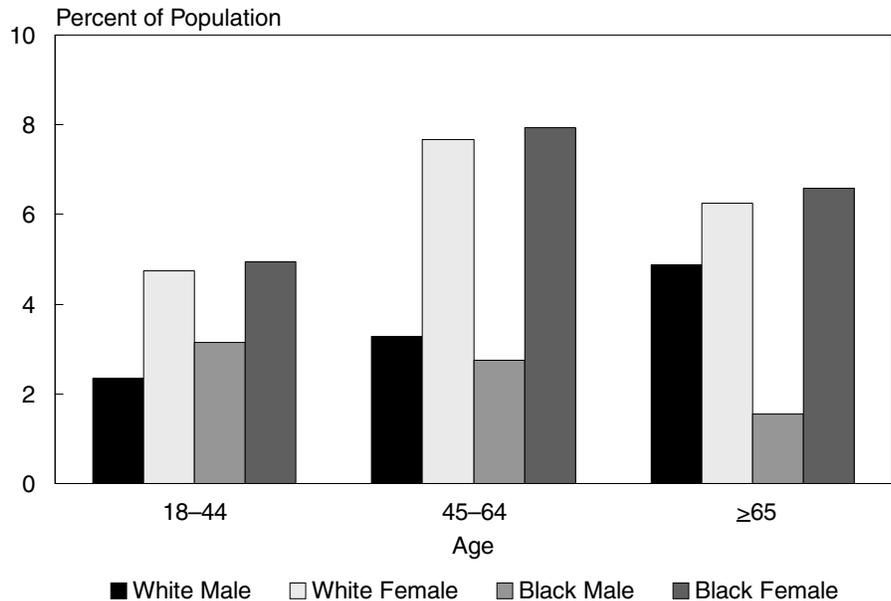
The prevalence of chronic bronchitis increased from 1980 to 1995 for all age groups. No clear trend was apparent between 1997 and 2002.²³



Note: Discontinuity between 1996 and 1997 is due to change in the question used to determine prevalence.

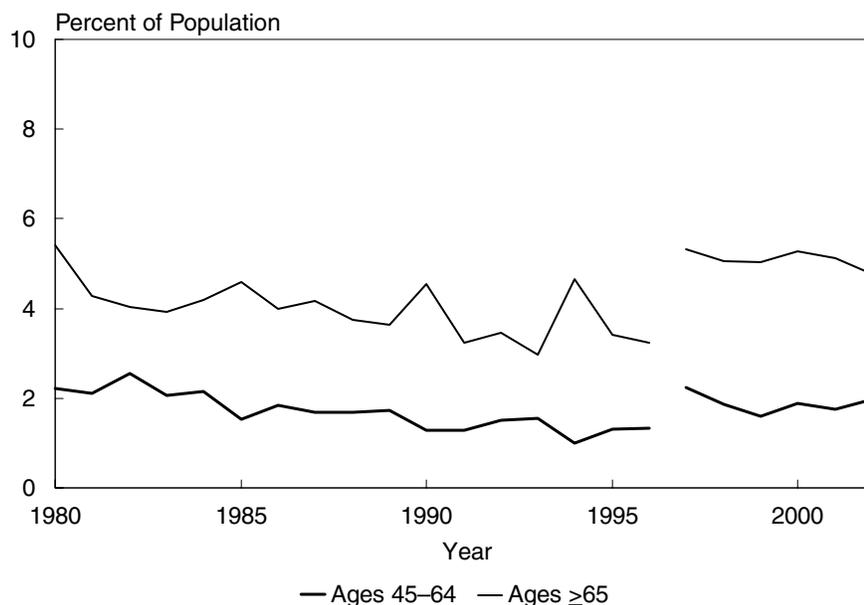
Chart 4-6
Prevalence of Chronic Bronchitis
by Age, Race, and Sex, U.S., 2002

In 2002, within race groups, chronic bronchitis was higher in females than in males for all ages. For females, it was similar in blacks and in whites. For males aged 18-44, it was higher in blacks than in whites, but higher in whites than in blacks aged ≥45.²³



Chronic Obstructive Pulmonary Disease

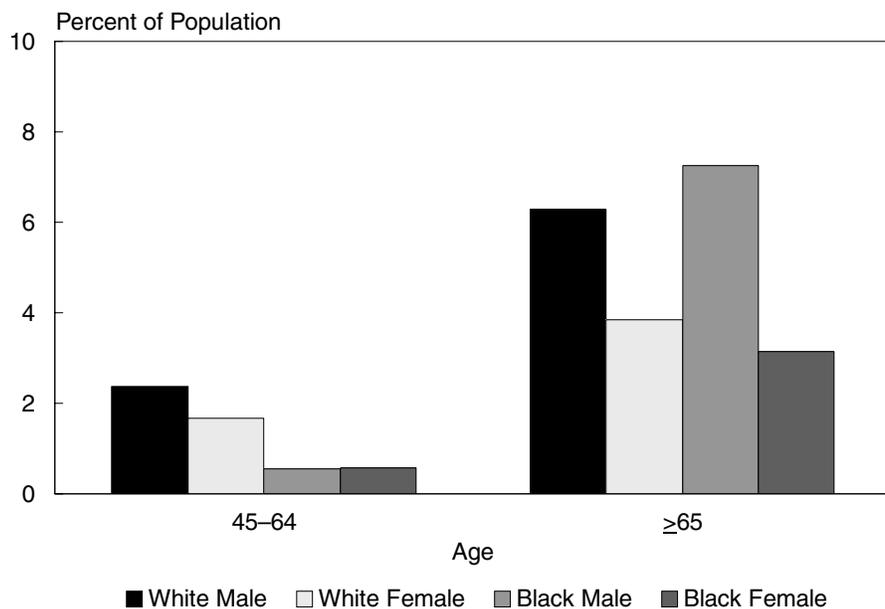
Chart 4-7
Prevalence of Emphysema by Age,
U.S., 1980-2002



The prevalence of emphysema declined from 1980 to 1996. No clear trend was apparent between 1997 and 2002.²³

Note: Discontinuity between 1996 and 1997 is due to change in the question used to determine prevalence.

Chart 4-8
Prevalence of Emphysema by Race and Sex,
Ages 45-64 and 65 and Over, U.S., 2002



In 2002, the prevalence of emphysema was higher in individuals aged ≥ 65 than those aged 45-64. In the older group, it was higher in males than females. In the younger group, it was higher in whites than blacks.²³

Chronic Obstructive Pulmonary Disease

Chart 4-9
Hospitalization Rates for Chronic Obstructive Pulmonary Disease, Ages 45-64 and 65 and Over, U.S., 1970-2002

Between 1970 and 2002, COPD hospitalization rates varied considerably.²⁷

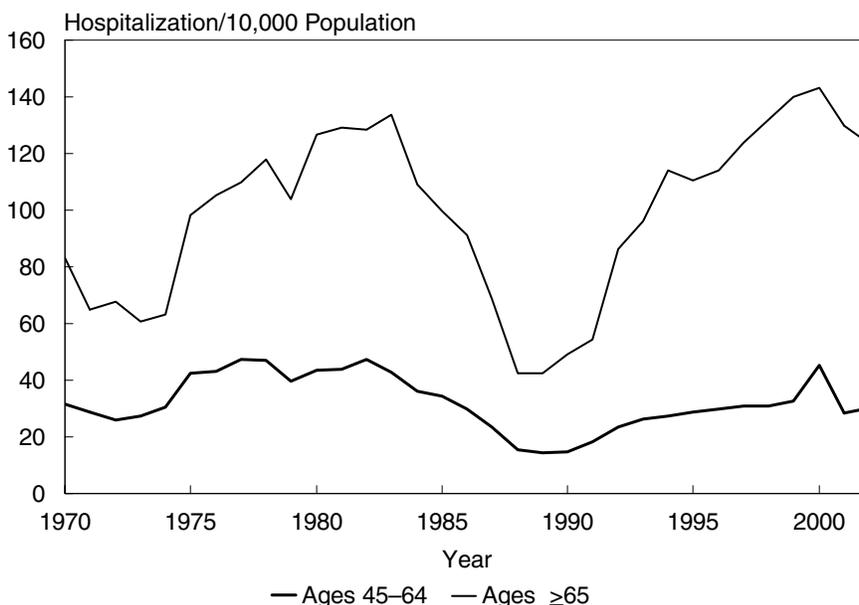
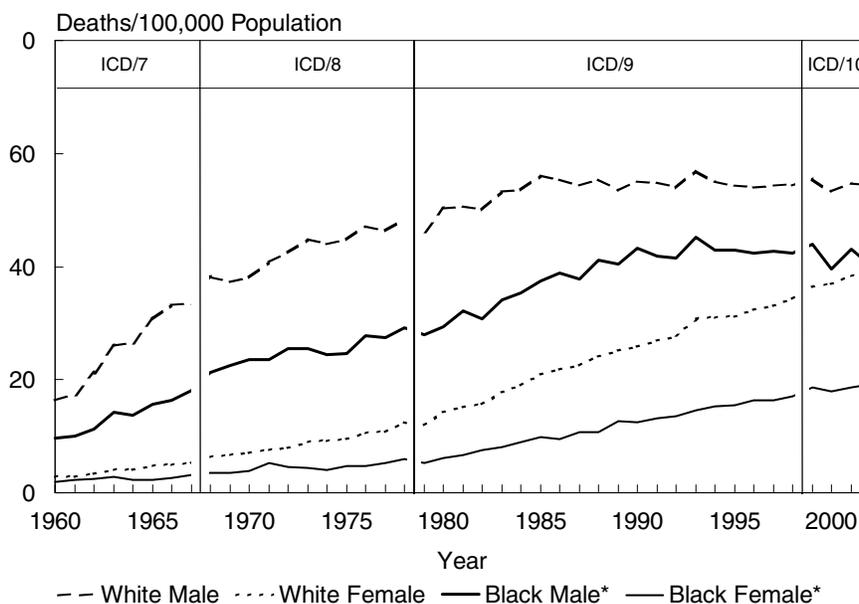


Chart 4-10
Age-Adjusted Death Rates for Chronic Obstructive Pulmonary Disease by Race and Sex, U.S., 1960-2002

COPD mortality, though highest in white males, remained relatively constant for them since the early 1980s. During the same period, it gradually increased in black males, but doubled in black and in white females.^{5-6, 28}

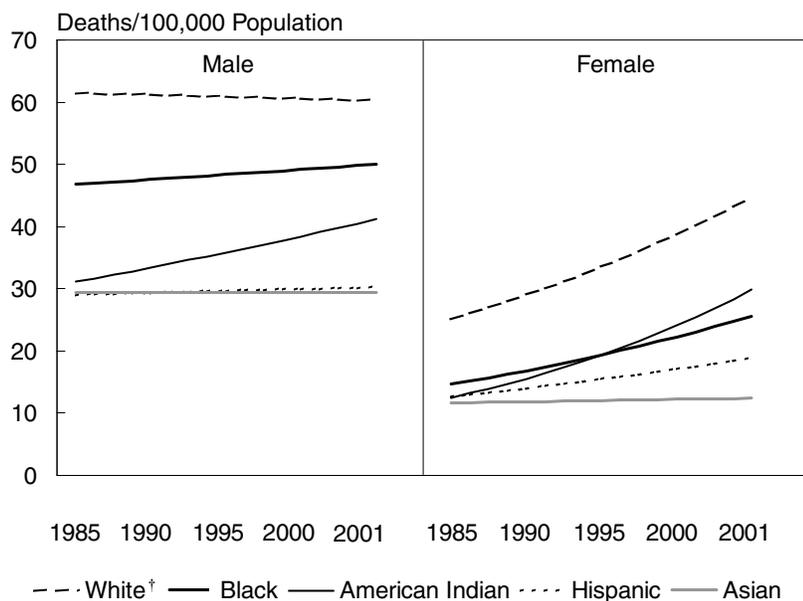


* Nonwhite from 1960 to 1967.

Chronic Obstructive Pulmonary Disease

Chart 4-11

Age-Adjusted Death Rates for Chronic Obstructive Pulmonary Disease* by Race/Ethnicity and Sex, U.S., 1985-2001



Between 1985 and 2001, COPD mortality (including asthma) increased substantially in women of various racial and ethnic groups, except Asian. For this group the increase was modest. In males, mortality increased in blacks and American Indians, but remained virtually unchanged in whites, Hispanics, and Asians.²⁹

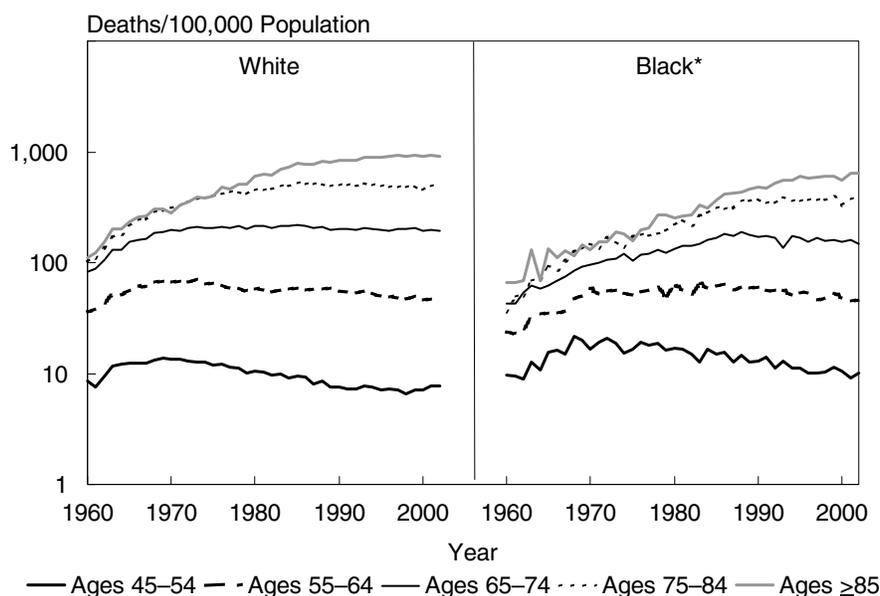
* COPD and allied conditions.

† Non-Hispanic.

Note: Each line is a log-linear regression derived from the actual rates. The comparability ratio 1.0563 was applied to rates reported in vital statistics reported for 1985-98.

Chart 4-12

Death Rates for Chronic Obstructive Pulmonary Disease in Males by Age and Race, U.S., 1960-2002



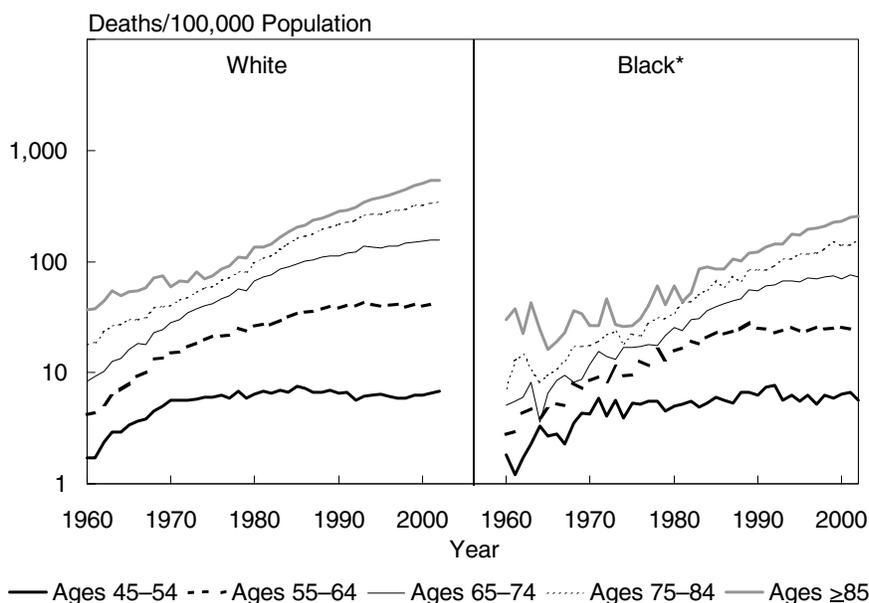
After initial increases, COPD death rates declined in white and in black males aged 45-64, became relatively stable for those aged 65-84, and continued to increase for those aged ≥ 85 .^{5-6, 28}

* Nonwhite from 1960 to 1967.

Chronic Obstructive Pulmonary Disease

Chart 4-13
Death Rates for Chronic Obstructive Pulmonary Disease
in Females by Age and Race, U.S., 1960-2002

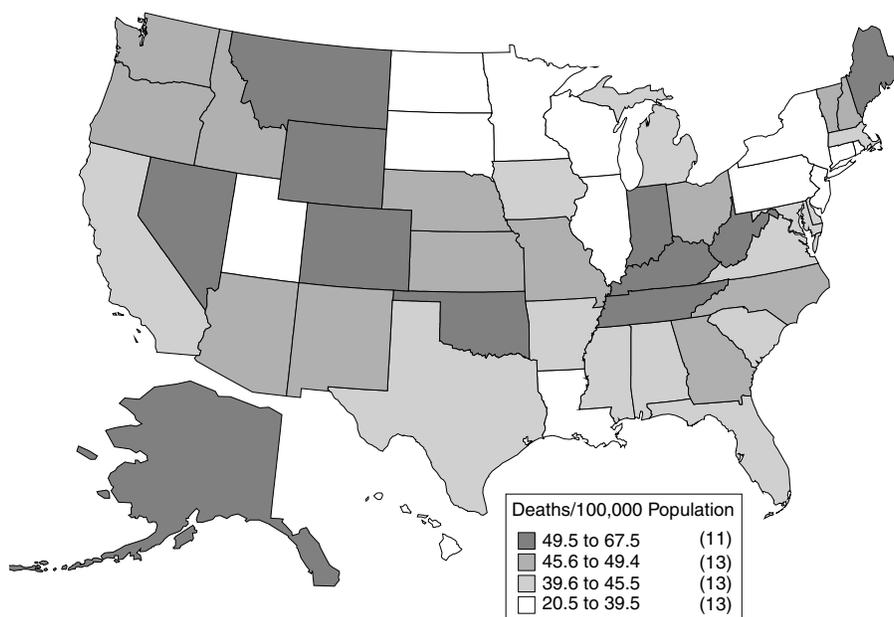
Since 1960, COPD death rates have increased in white and in black females at all ages. For the last several years, however, the rates have been relatively stable among those in the younger age range, but continued to increase among those in older age ranges.^{5-6, 28}



* Nonwhite from 1960 to 1967.

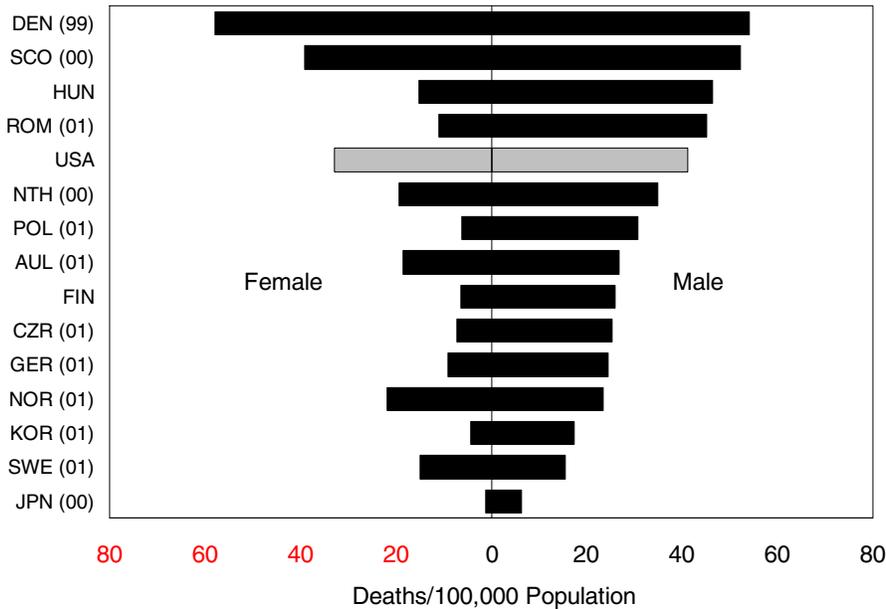
Chart 4-14
Age-Adjusted Death Rates for Chronic Obstructive
Pulmonary Disease by State, U.S., 1999-2000

In 1999-2000, COPD mortality tended to be high in the western Mountain States.⁵



Chronic Obstructive Pulmonary Disease

Chart 4–15
Age-Adjusted Death Rates* for Chronic Obstructive Pulmonary Disease by Country and Sex, Ages 35–74, 2002

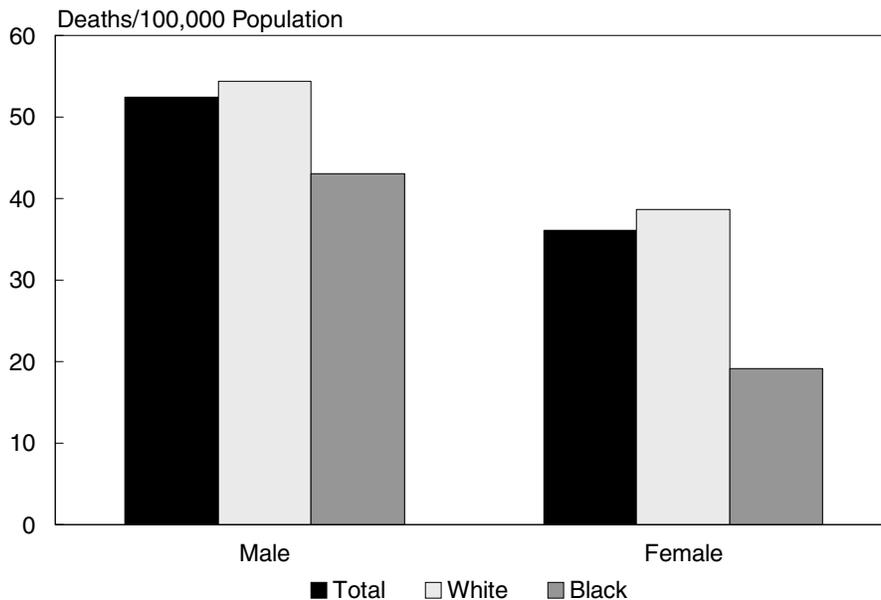


Among 15 industrialized countries, the United States ranked third in COPD mortality for females and fifth for males in 2002.³⁸

* Age-adjusted to European standard.

Note: Data for 2002 unless otherwise indicated in parentheses.

Chart 4–16
Age-Adjusted Death Rates for Chronic Obstructive Pulmonary Disease by Race and Sex, U.S., 2002



In 2002, COPD mortality was higher in males than in females. For males, it was 26% higher in whites than in blacks, and for females, it was two times higher in whites than in blacks.²⁸

Chronic Obstructive Pulmonary Disease/Asthma

Chart 4-17
Death Rates for Chronic Obstructive Pulmonary Disease
by Age, Race, and Sex, U.S., 2002

In 2002, COPD mortality increased significantly with age for all race and sex groups. It was highest in white males aged ≥ 65 and lowest in black females aged ≥ 45 .²⁸

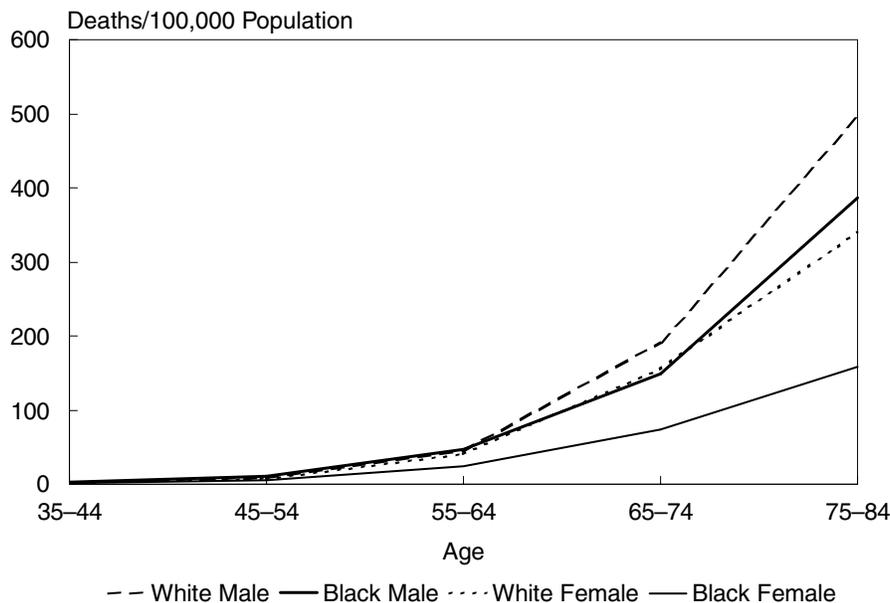
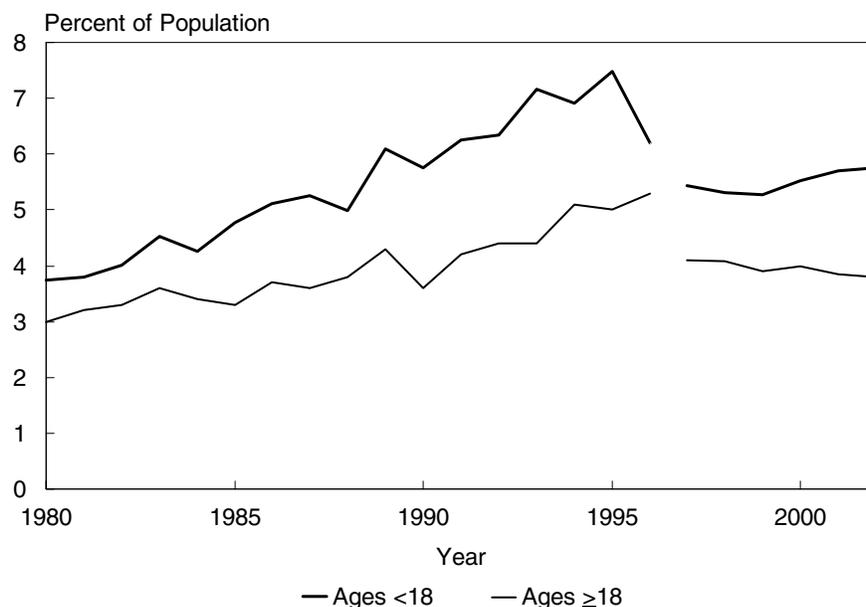


Chart 4-18
Prevalence of Asthma, Ages Under 18 and 18 and Over,
U.S., 1980 to 2002

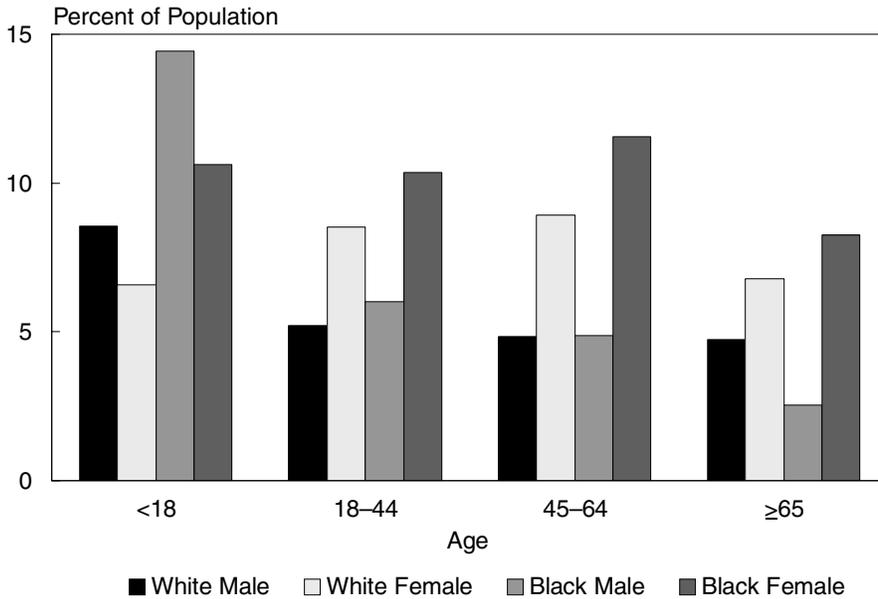
Between 1980 and the mid-1990s, the prevalence of asthma increased; from 1997 to 2002, asthma attack prevalence increased for persons aged < 18 and declined for persons aged ≥ 18 .²³



Note: Discontinuity between 1996 and 1997 is due to change in the question used to determine prevalence.

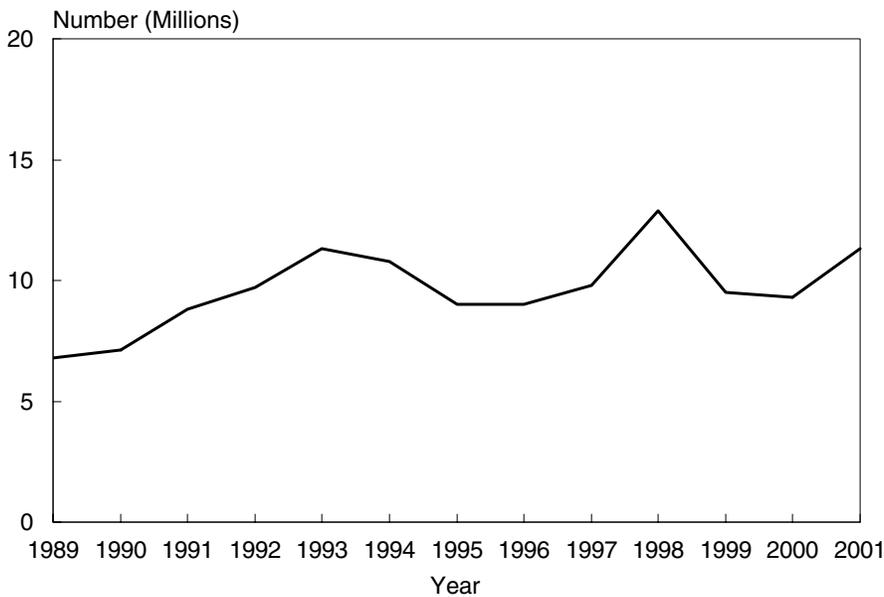
Asthma

Chart 4-19
Asthma Prevalence by Age, Race, and Sex,
U.S., 2002



In 2002, asthma prevalence within racial groups was higher for females than for males aged ≥ 18 ; for those aged < 18 , it was higher for males than for females. Within sex groups, the prevalence was higher in blacks than in whites for each age group except for ages ≥ 65 , where it was higher in white than in black males.²³

Chart 4-20
Physician Office Visits for Asthma,
U.S., 1989-2001



Between 1989 and 2001, the number of physician office visits for asthma increased.³²

Asthma

Chart 4-21
Hospitalizations for Asthma,
U.S., 1980-2002

Hospitalizations with asthma as the primary diagnosis remained relatively stable between 1980 and 2002; hospitalizations with asthma as a secondary diagnosis, however, increased significantly from 1990 to 2002.²⁷

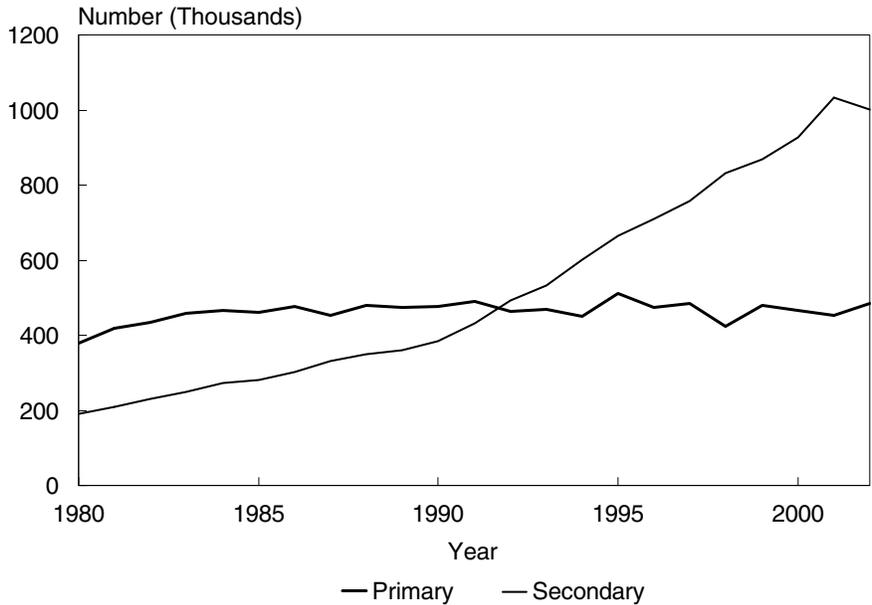
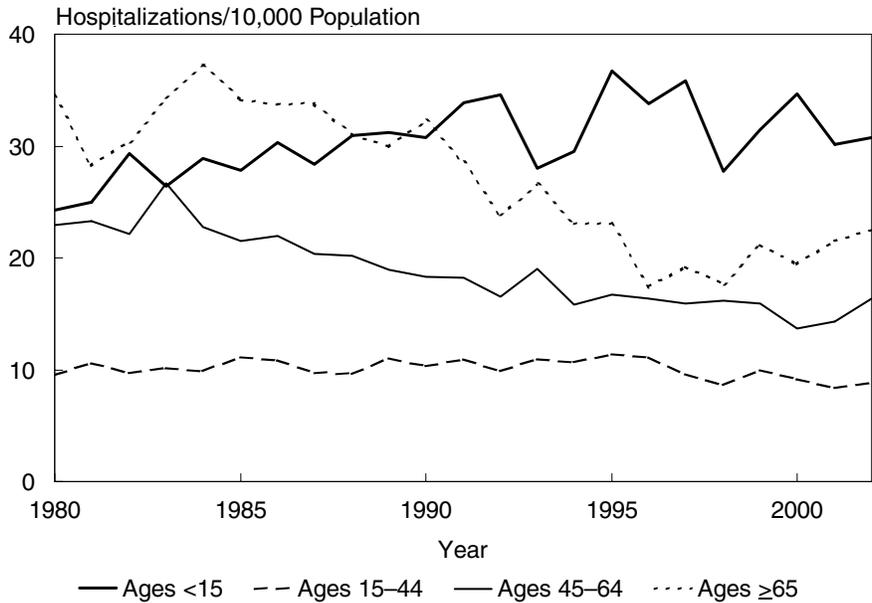


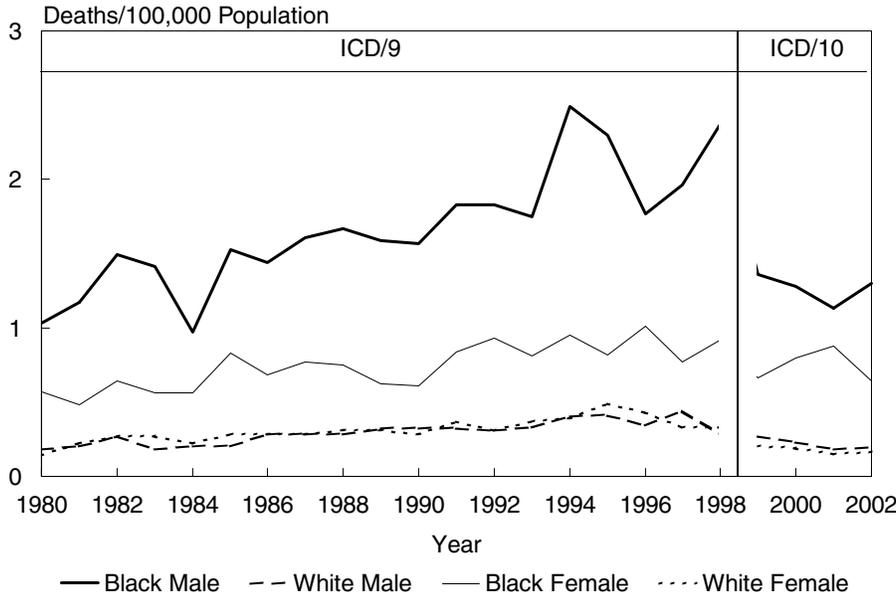
Chart 4-22
Hospitalization Rates for Asthma
by Age, U.S., 1980-2002

From 1980 to 2002, hospitalization rates for asthma were lowest among individuals aged 15-44. Beginning in 1991, they were highest among those aged <15. For those aged ≥45 the rates have been decreasing since the mid-1980s.²⁷



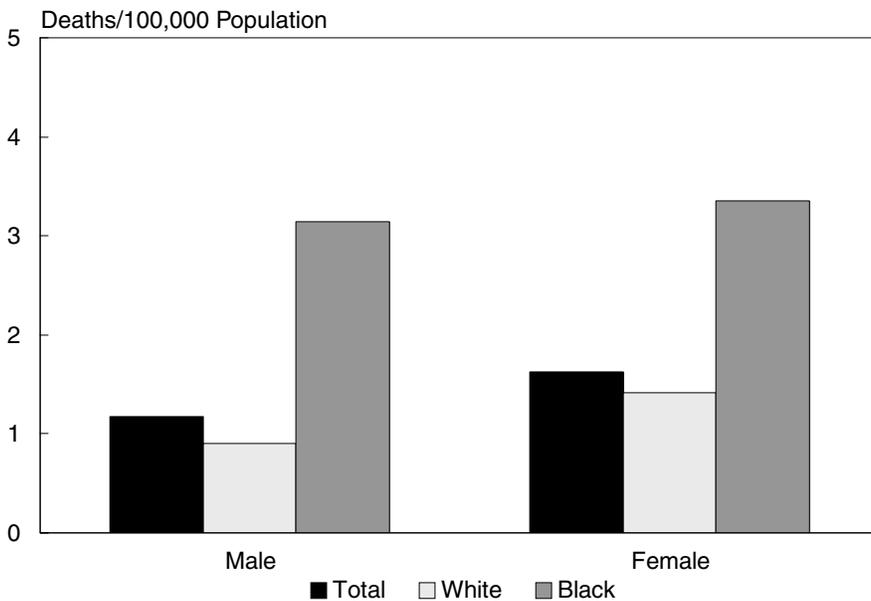
Asthma

Chart 4-23
Age-Adjusted Death Rates for Asthma by Race and Sex,
Ages 1-24, U.S., 1980-2002



Although asthma mortality fluctuated between 1980 and 2002, it tended to increase for each race/sex group, aged 1-24 until 1995. Since then, mortality has declined modestly in whites.^{5, 28}

Chart 4-24
Age-Adjusted Death Rates for Asthma
by Race and Sex, U.S., 2002



In 2002, asthma mortality was 3.5 times higher in black males than in white males, 2.4 times higher in black females than in white females, and approximately 39% higher in females than in males.²⁸

Asthma

Chart 4-25
Death Rates for Asthma
by Age, Race, and Sex, U.S., 2002

In 2002, for males and females aged 1–34, asthma mortality was much higher in blacks than in whites.²⁸

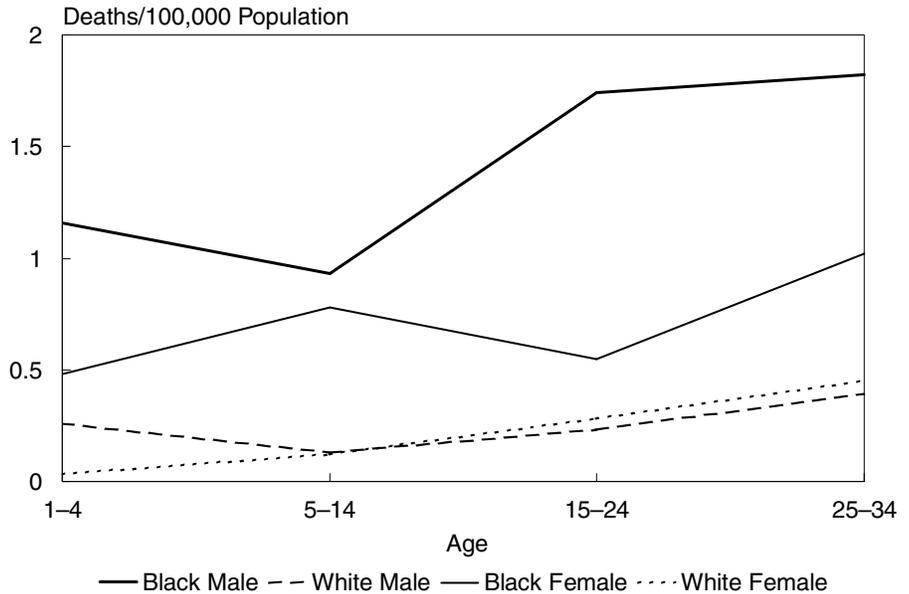
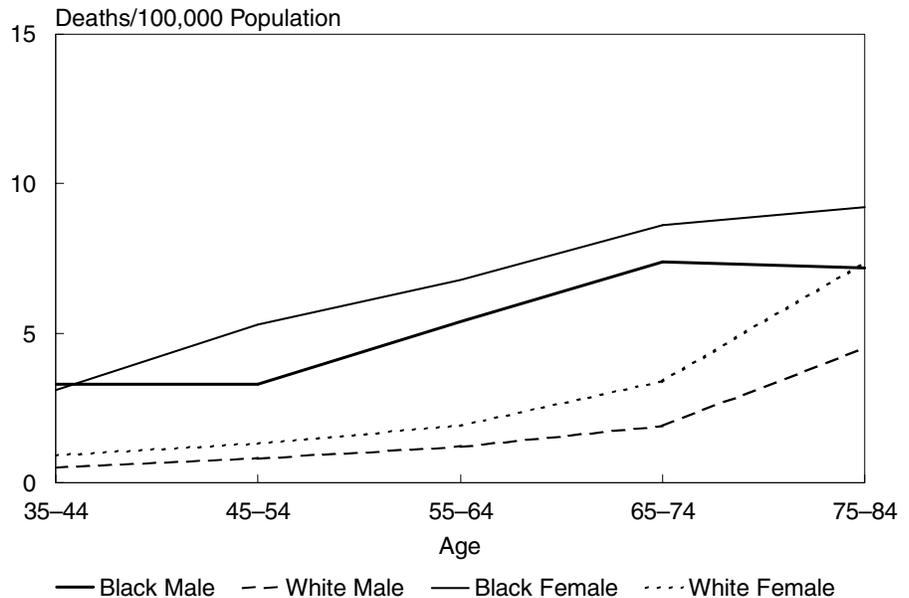


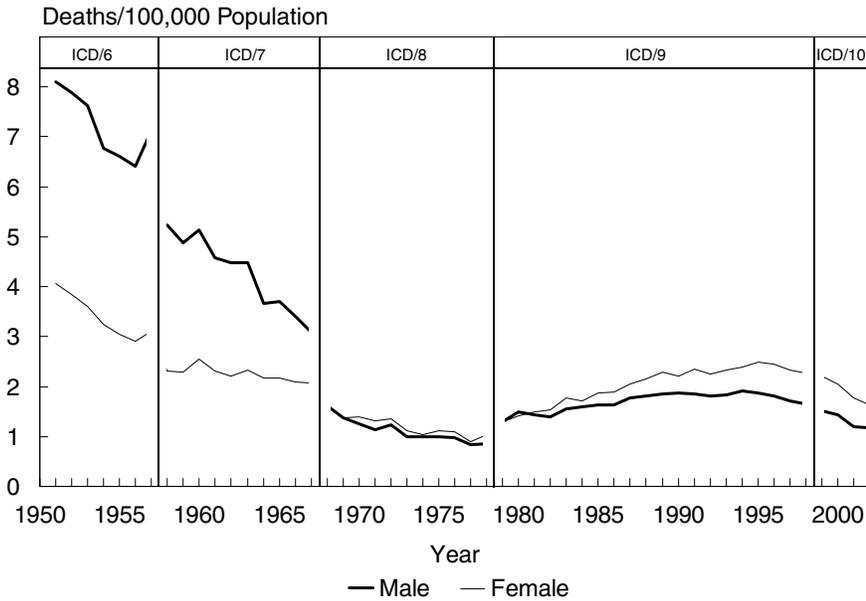
Chart 4-26
Death Rates for Asthma
by Age, Race, and Sex, U.S., 2002

In 2002, asthma mortality was much higher in blacks than in whites aged 35–84. Within race groups, it was almost always higher in females than in males.²⁸



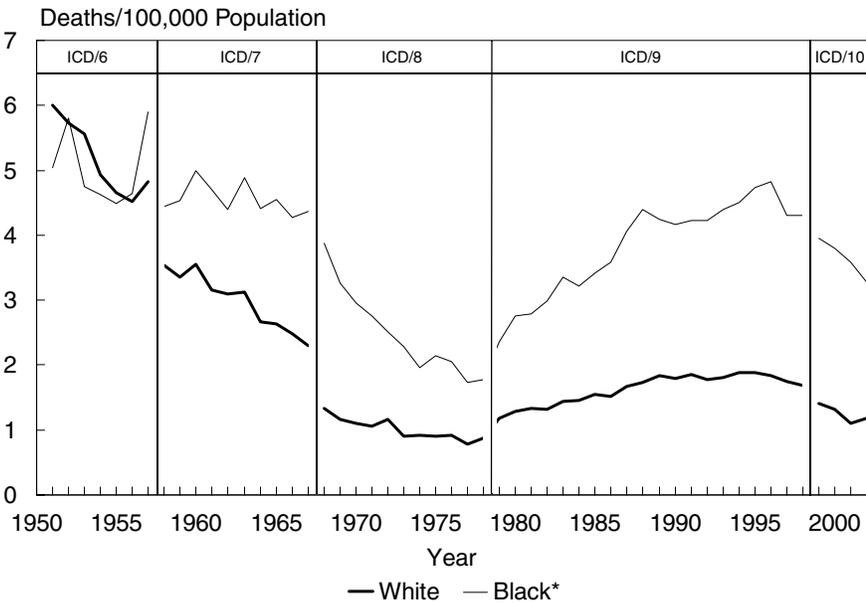
Asthma

Chart 4-27
Age-Adjusted Death Rates for Asthma
by Sex, U.S., 1951-2002



Asthma mortality declined from 1950 to 1978, then increased until the mid-1990s and subsequently declined again. Rates were much higher in males than in females before the late-1960s, and after that became higher in females than in males.^{5, 28}

Chart 4-28
Age-Adjusted Death Rates for Asthma
by Race, U.S., 1951-2002

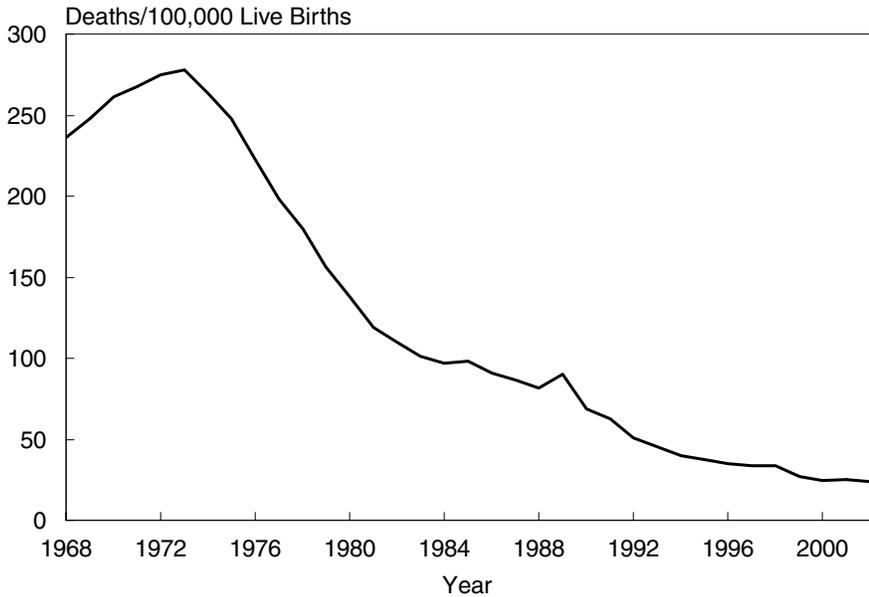


Between 1978 and 1996, the black-white gap in asthma mortality increased, with the rate being much higher in blacks than in whites. Between 1996 and 2002, the gap remained wide as the rates began to decline.^{5, 28}

* Nonwhite from 1951 to 1967.

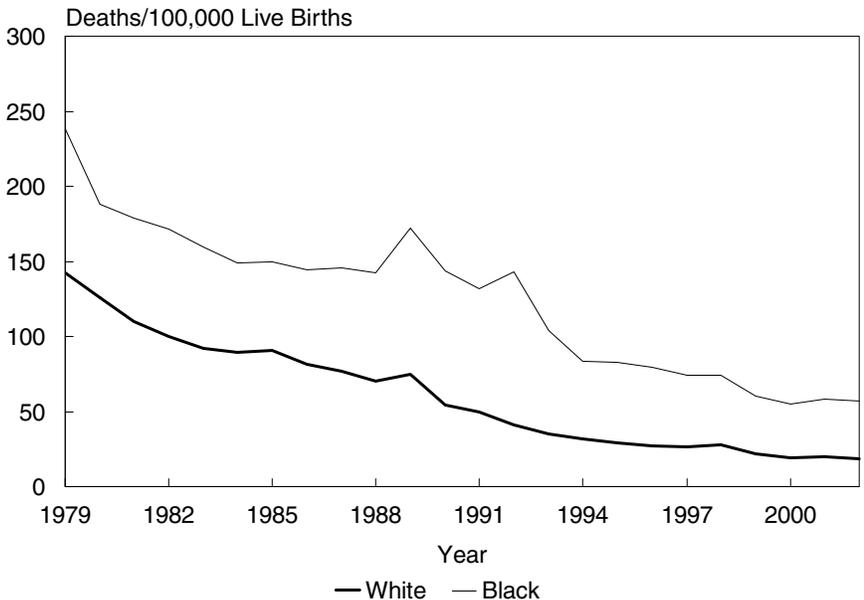
Neonatal Respiratory Distress Syndrome

Chart 4-31
Infant Mortality Rate for Respiratory Distress Syndrome,
U.S., 1968-2002



Infant mortality for RDS declined steeply from 1974 to 1981, followed by a slower but appreciable decline.^{5, 25-26}

Chart 4-32
Infant Mortality Rate for Respiratory Distress Syndrome
by Race, U.S., 1979-2002

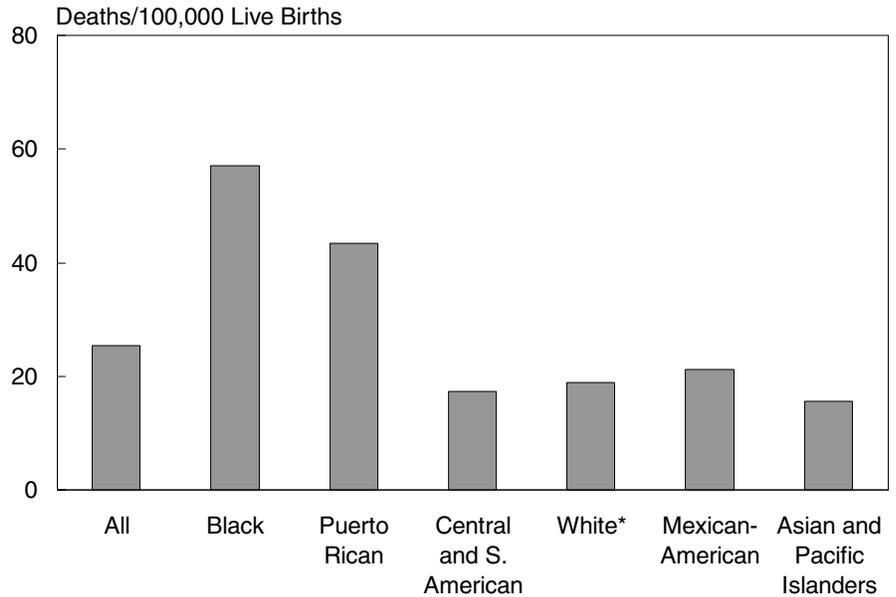


Although the decrease in infant mortality for RDS has been appreciable in both blacks and whites from 1979 to 2002, a black-white gap still remained in 2002.^{5, 25-26}

Neonatal Respiratory Distress Syndrome/SIDS

Chart 4-33
Infant Mortality Rate for Neonatal Respiratory Distress Syndrome
by Race/Ethnicity, U.S., 2001

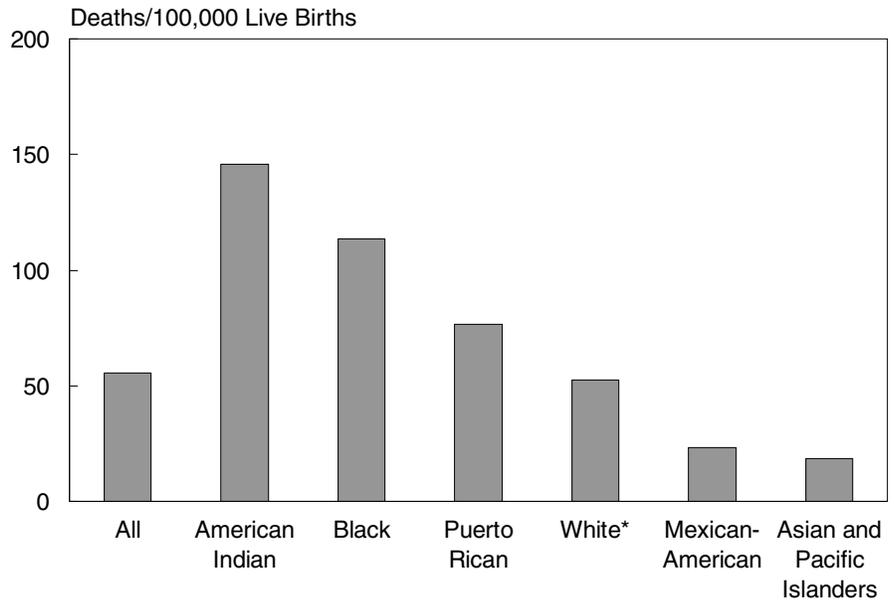
In 2001, infant mortality for neonatal RDS was highest in blacks and Puerto Ricans and lowest in Asian and Pacific Islanders.⁴⁰



* Non-Hispanic.
 Note: No data for American Indians.

Chart 4-34
Infant Mortality Rate for Sudden Infant Death Syndrome
by Race/Ethnicity, U.S., 2001

In 2001, infant mortality for SIDS was highest in American Indians and blacks and lowest in Mexican-Americans and Asian and Pacific Islanders.⁴⁰



* Non-Hispanic.
 Note: No data for Central and South Americans.

5. Blood Diseases

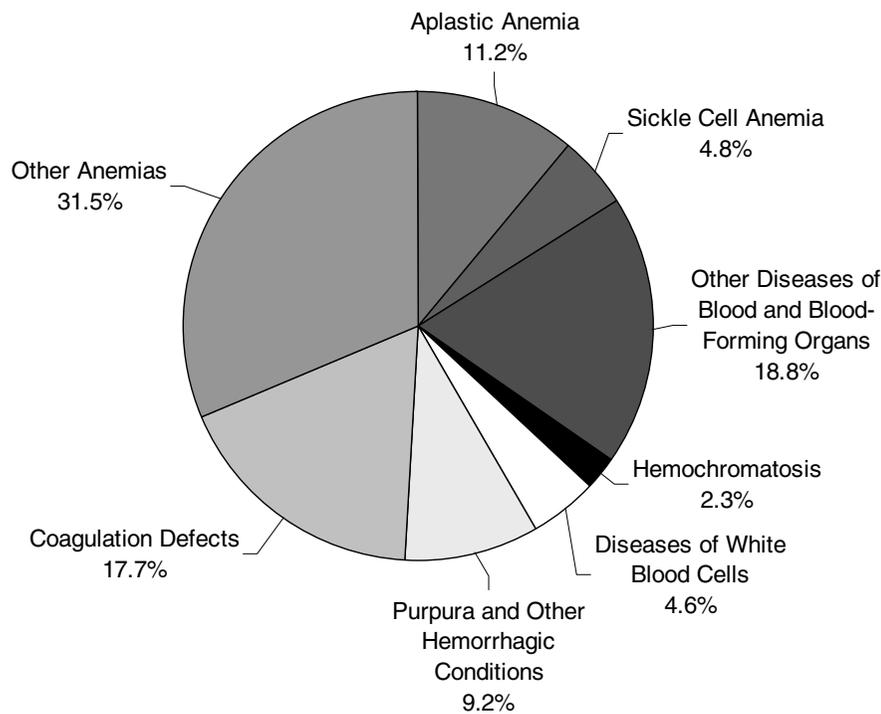
The term *blood diseases* is used here to mean diseases within the diagnostic categories listed in “Diseases of the Blood and Blood-Forming Organs and Certain Disorders Involving the Immune Mechanism” of the ICD; hemochromatosis is also included in this chapter. Blood-clotting diseases, most of which are subsumed under CVD, have been excluded, as have other blood diseases such as bleeding and red blood disorders of the newborn and serum hepatitis.

Chart 5–1 shows the distribution of deaths in 2001 by blood disease subgroups. Chart 5–2 contains a list of blood diseases; their 9th revision ICD codes; 2002

estimates of hospital discharges and length of stay, 2001 estimates of physician office visits for the diagnostic codes; 10th revision ICD codes for the blood diseases; and number of deaths in 2001 for those codes. Subsequent charts display morbidity and mortality for aplastic anemia and sickle cell anemia.

The annual death rates for these diseases are very small and may vary considerably from year to year. By using combined mortality over 2 to 5 years to obtain average annual death rates rather than statistics for a single year, it is possible to improve data reliability for race and sex comparisons.

Chart 5–1
Blood Disease Deaths,
Percent by Subgroup, U.S., 2001



Total Deaths = 9,755 (100%)

Blood Diseases

Chart 5-2
**Number of Hospitalizations, Physician Office Visits,
 and Deaths for Selected Blood Diseases, U.S., 2001 and 2002***

Diagnostic Category	ICD/9 Codes	Hospitalizations			ICD/10 Codes	Deaths
		First-Listed Discharge (1,000)	Length of Stay (Days)	Physician Office Visits (1,000)		
Total	280-289, 275	446	4.4	3,836	D50-D89, E83.1	9,755
Anemias	280-285	312	4.2	2,410	D50-D64	4,627
Iron deficiency anemia	280	79	3.4	477	D50	130
Other deficiency anemia	281	5	4.4	130	D51-D52	81
Cooley's anemia	282.4	0	0	7	D56	21
Sickle cell anemia	282.6	84	5.3	45	D57.0, D57.1	471
Aplastic anemia	284	29	5.0	101	D60-D61	1,096
Other and unspecified anemias	Residual	115	3.7	1,650	Residual	2,828
Coagulation defects	286	23	4.3	0	D65-D68	1,729
Hemophilia: factor VIII	286.0	0	0	0	D66	87
Hemophilia: factor IX	286.1	0	0	0	D67	4
Other	Residual	23	4.3	0	Residual	1,638
Purpura and other hemorrhagic conditions	287	31	5.2	423	D69	903
Primary thrombocytopenia	287.3	16	6.0	224	D69.3, D69.4	367
Unspecified thrombocytopenia	287.4	0	0	0	D69.5, D69.6	498
Other	Residual	15	4.3	199	Residual	38
Diseases of white blood cells	288	59	5.2	224	D70-D72	444
Other diseases of blood and blood-forming organs	289	21	3.3	714	D73-D89	1,832
Hemochromatosis	275	0	0	65	E83.1	220

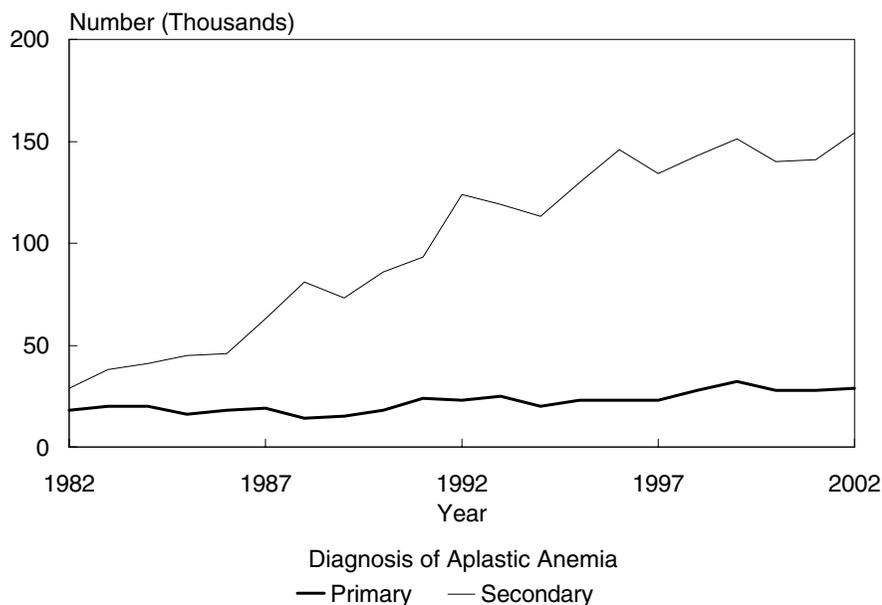
* 2002 estimates for Hospitalizations; 2001 estimates for Physician Office Visits and Deaths.

Note: Estimates of hospitalizations and physician office visits are subject to sampling variability. Estimates of hospitalizations below 15,000 have a relative standard error of more than 16 percent. Estimates of physician office visits below a million have a relative standard error of more than 30 percent.

Compiled from references 27, 28, and 32.

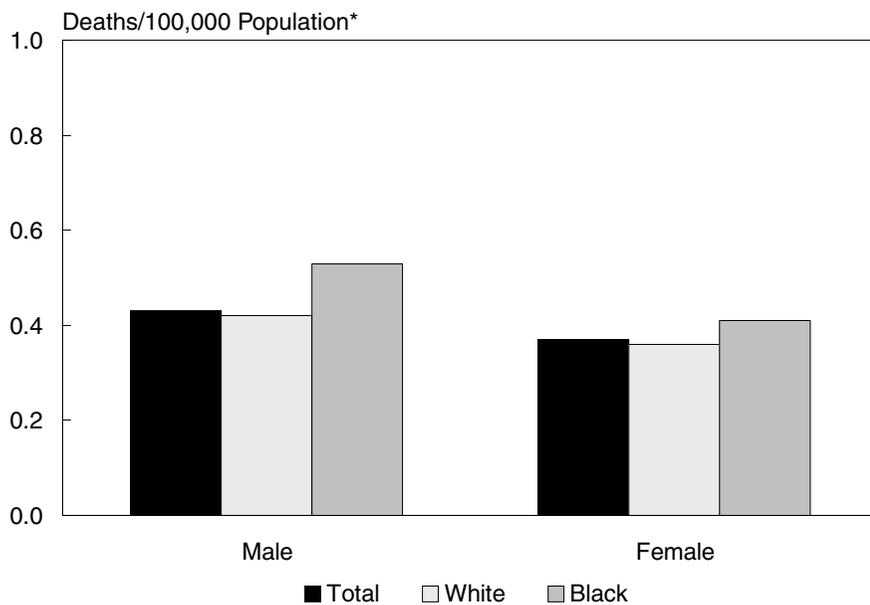
Aplastic Anemia

Chart 5-3
Hospitalizations for Aplastic Anemia,
U.S., 1982-2002



Hospitalizations for aplastic anemia nearly quadrupled by 2002 compared with 1982. The increase was due to aplastic anemia as a secondary diagnosis.²⁷

Chart 5-4
Age-Adjusted Death Rates for Aplastic Anemia
by Race and Sex, U.S., 1999-2000



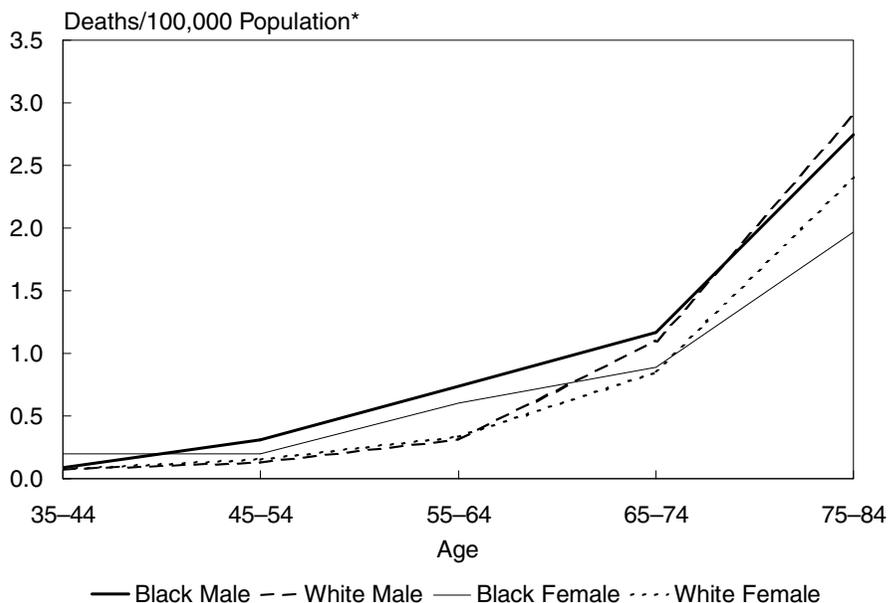
Mortality from aplastic anemia was higher in males than in females. Within sex groups, it was higher in blacks than in whites.⁵

* Average annual rates.

Aplastic Anemia/Sickle Cell Anemia

Chart 5-5
Death Rates for Aplastic Anemia
by Age, Race, and Sex, U.S., 1999-2000

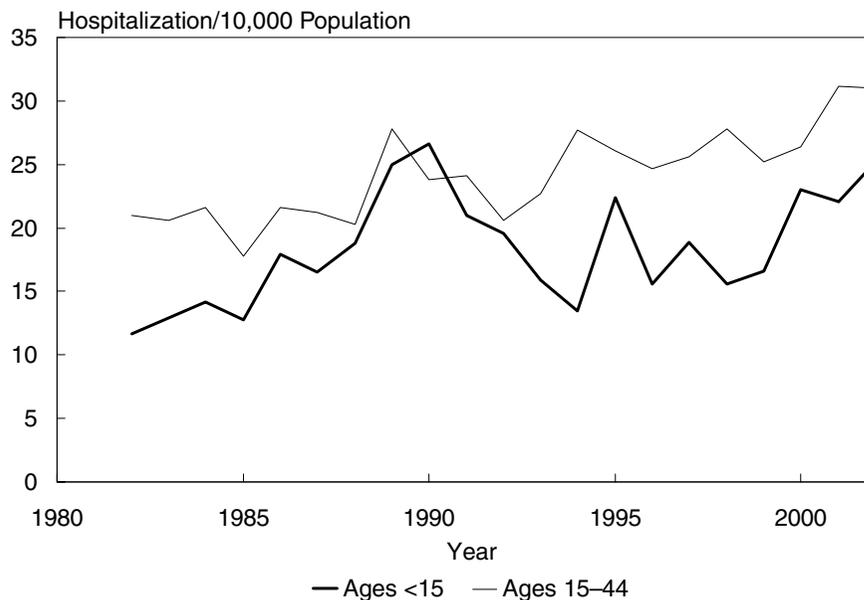
Among blacks aged ≥ 45 , aplastic anemia death rates were higher in males than in females; among whites aged ≥ 65 they were higher in males than in females. Within sex groups, the rates were higher in blacks than in whites except in the oldest age group.⁵



* Average annual rates.

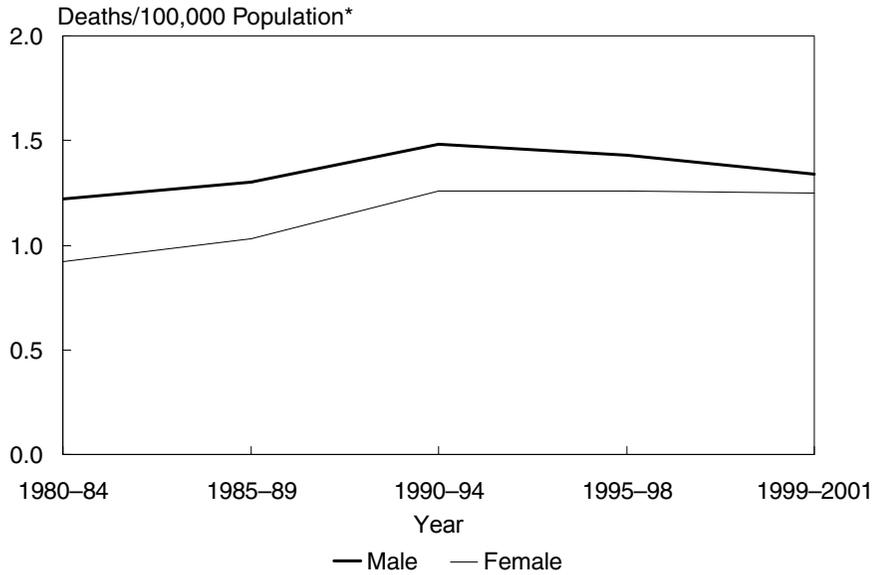
Chart 5-6
Hospitalization Rates for Sickle Cell Anemia in Blacks,
Ages Under 15 and 15-44, U.S., 1982-2002

Hospitalization rates for sickle cell anemia varied considerably between 1982 and 2002. Overall they increased for both age groups, with rates in the older group remaining higher than those in the younger group.²⁷



Sickle Cell Anemia

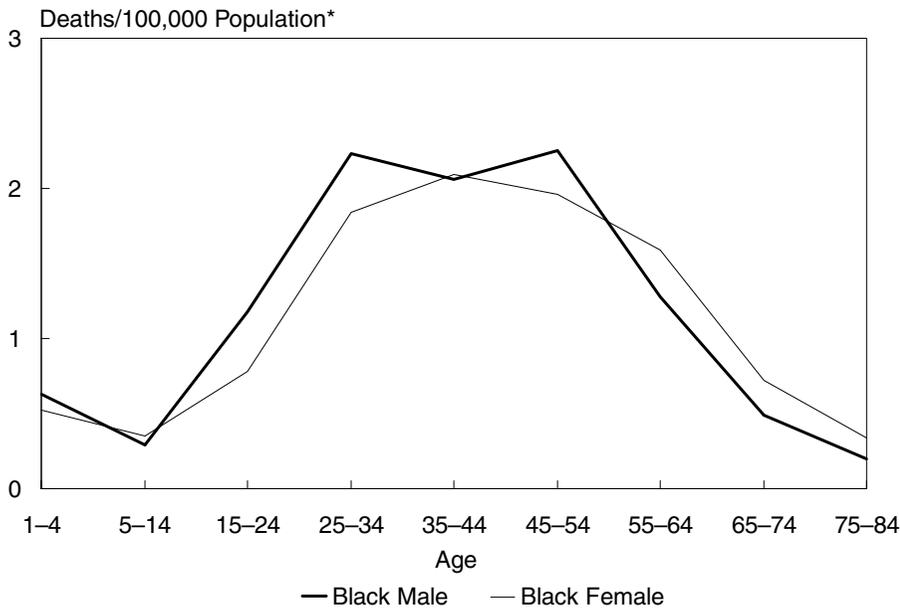
Chart 5-7
Age-Adjusted Death Rates for Sickle Cell Anemia
in Blacks by Sex, U.S., 1980-84 to 1999-2001



Sickle cell anemia mortality in blacks increased between 1980-84 and 1990-94 and then declined. The rate is higher in males than in females, but the gap between them is narrowing.⁵⁻⁶

* Average annual rates.

Chart 5-8
Death Rates for Sickle Cell Anemia in Blacks
by Age and Sex, U.S., 1999-2001



Sickle cell anemia mortality was relatively similar for males and for females. Death rates were especially high for individuals between ages 25 and 64 years.⁵

* Average annual rates.

Appendixes

International Classification of Diseases

Estimated Comparability Ratios

Definition of Terms

Abbreviations

References

Appendix A

International Classification of Diseases: Codes for Selected Diagnostic Categories (6th, 7th, 8th, 9th, and 10th Revisions)

Diagnostic Term in Chartbook	ICD/6 1949–1957	ICD/7 1958–1967	ICDA/8 1968–1978	ICD/9 1979–1998	ICD/10 1999–
Cardiovascular diseases ^a	330–334, 400–468	330–334, 400–468	390–458	390–459	I00–I99
Heart disease	400–402, 410–443	400–402, 410–443	390–398, 402, 404–429	390–398, 402, 404–429	I00–I09, I11, I13, I20–I51
Coronary heart disease ^b	420, 422	420, 422	410–413	410–414, 429.2	I20–I25
Acute myocardial infarction	*	*	410	410	I21, I22
Heart failure ^c	†	†	427.0, 427.1	428	I50
Congestive heart failure	†	†	427.0	428	I50.1
Cardiomyopathy	†	†	†	425	I42
Cerebrovascular diseases (stroke) ^d	330–334	330–334	430–438	430–438	I60–I69
Diseases of arteries	450–456	450–456	440–448	440–448	I70–I78
Congenital anomalies of the circulatory system ^e	†	†	746–747	745–747	Q20–Q28
Chronic obstructive pulmonary disease ^f	500–502, 527.1	500–502, 527.1	490–492, 519.3	490–492, 494– 496	J40–J44
Asthma	241	241	493	493	J45–J46
Neonatal respiratory distress syndrome ^g	†	†	776.1–776.2	769	P22

a The ICD term is diseases of the circulatory system.

b The ICD/6 and ICD/7 term is arteriosclerotic heart disease; the ICDA/8, ICD/9, and ICD/10 term is ischemic heart disease.

c The ICDA/8 terms are congestive heart failure and left ventricular failure. The ICD/9 and ICD/10 term is heart failure (428) or CHF (428.0)

d The ICD/6 and ICD/7 term is vascular diseases affecting the central nervous system; the ICDA/8, ICD/9, and ICD/10 term is cerebrovascular disease.

e The ICDA/8 terms are congenital anomalies of heart and other congenital anomalies of circulatory system. The ICD/9 terms are bulbus cordis anomalies and anomalies of cardiac septal closure, other congenital anomalies of heart, and other congenital anomalies of circulatory system.

f The ICD/6 and ICD/7 terms are chronic bronchitis, unqualified bronchitis, and emphysema without mention of bronchitis; the ICDA/8 terms are chronic bronchitis, unqualified bronchitis, emphysema, and chronic obstructive lung disease; the ICD/9 and ICD/10 terms are chronic bronchitis, bronchitis not specified as acute or chronic, emphysema, bronchiectasis, extrinsic allergic alveolitis, and chronic airways obstruction not elsewhere classified.

g The ICDA/8 terms are hyaline membrane disease and respiratory distress syndrome. The ICD/9 term is respiratory distress syndrome. The ICD/10 is respiratory distress of newborns.

* No code for this category exists in this ICD revision.

† No data for this category are presented in the *Chart Book* in this period.

Appendix B

Estimated Comparability Ratios for Selected Causes of Death, U.S.

Cause of Death	Codes of the International Classification of Diseases		Numbers of Deaths*		Comparability Ratio†
	ICD/10	ICD/9	ICD/10	ICD/9	
Malignant neoplasms	C00–C97	140–208	464,688	461,544	1.0068
Major cardiovascular diseases	I00–I78	390–434, 436–448	796,919	798,435	0.9981
Diseases of the heart	I00–I09, I11, I13, I20–I51	390–398, 402, 404, 410–429	615,564	624,405	0.9858
Coronary heart disease	I20–I25	410–414, 429.2	466,459	466,935	0.9990
Heart failure	I50	428	44,297	42,554	1.0410
CVD (stroke)	I60–I69	430–434, 436–438	137,264	129,640	1.0588
Diseases of arteries	I70–I78	440–448	32,133	33,706	0.9533
Influenza and pneumonia	J10–J18	480–487	50,526	72,371	0.6982
Chronic lower respiratory disease	J40–J47	490–494, 496	94,326	90,022	1.0478
COPD	J40–J44	490–492, 494, 496	90,109	85,304	1.0563
Asthma	J45–J46	493	4,217	4,718	0.8938
Neonatal RDS	P22	769	917	894	1.0257
SIDS	R95	798.0	2,575	2,485	1.0362

* From a sample of deaths in 1996.⁸

† Deaths coded to ICD/10 divided by deaths coded to ICD/9.

Appendix C

Definition of Terms

- Age-adjusted death rate:** An age-adjusted rate is a summary rate for a given age range and is computed by multiplying the age-specific rates for a given diagnosis (or cause of death) by the standard population for the age range and summing those products. The standard population is the U.S. population in 2000 as it is distributed proportionately in 10-year age groups.^{10-11, 29}
- Chronic condition:** A condition is considered chronic if (1) the respondent (in a health interview) indicates it was first noticed more than 3 months before the initial date of the interview, or (2) it is a type of condition that ordinarily has a duration of more than 3 months.²⁹
- Comparability ratio:** A comparability ratio is the number of deaths from a cause as coded by an ICD revision divided by the number of deaths from the closest similar cause as coded by the preceding ICD revision. A sample of death certificates from a chosen year is used for the calculation. The ratios measure discontinuities in mortality trends resulting from the introduction of a new ICD revision.⁸
- Hospitalization:** Hospitalization refers to hospital discharge, the formal release of a hospital inpatient. It may be the result of death or transfer to a place of residence, nursing home, or another hospital. First-listed diagnosis is the coded diagnosis identified as the primary diagnosis or the diagnosis first listed on the face sheet of the hospital medical record. Hospital refers to non-Federal, short-stay (average length of patient's stay is less than 30 days), general (e.g., medical or surgical) or children's general hospitals, with six or more beds for inpatient use.²⁹
- Incidence:** Incidence is the number of cases that had their onset during a specified period of time, usually a year.²⁹
- Infant mortality rate:** Infant mortality is the number of deaths occurring in infants younger than 1 year of age from a cause (or all causes) divided by the number of live births occurring the same year, and then expressed as the rate per 100,000 live births for that year.²⁹
- Limited in activity:** Also called chronic activity limitation, it refers to the limitation of a person's usual activity due to a chronic condition.²⁹
- Morbidity:** Morbidity refers to incidence, prevalence, hospitalizations, and physician office visits.

Appendix C

Definition of Terms (continued)

- Prevalence: The prevalence of a condition is the number of persons who have the condition at a given time.²⁹
- Relative standard error: The standard error is primarily a measure of sampling error—not measurement error—that is, the variation that might occur by chance because only a sample of the population is surveyed. The relative standard error of an estimate is obtained by dividing the standard error of the estimate by the estimate itself.²⁹
- Underlying cause of death: The underlying cause of death is the disease or injury that initiated the events leading directly to death. It is selected from the conditions entered in the cause-of-death section of the death certificate. When more than one cause or condition is entered by the physician, the underlying cause is determined by the sequence of conditions on the certificate, provisions of the ICD, and associated classification rules.²⁹

Appendix D

Abbreviations*

AMI	acute myocardial infarction
CHD	coronary heart disease
CHF	congestive heart failure
CMS	Centers for Medicare & Medicaid Services
COPD	chronic obstructive pulmonary disease
CVD	cardiovascular diseases
ICD	International Classification of Diseases
NCHS	National Center for Health Statistics
NHANES	National Health and Nutrition Examination Survey
NHIS	National Health Interview Survey
NHLBI	National Heart, Lung, and Blood Institute
RDS	respiratory distress syndrome
SIDS	sudden infant death syndrome
WHO	World Health Organization

* Country abbreviations may be found on the following page.

Appendix D

Abbreviations (continued)

AUL	Australia
CZR	Czech Republic
DEN	Denmark
FIN	Finland
GER	Germany
HUN	Hungary
JPN	Japan
KOR	Republic of Korea
NOR	Norway
NTH	Netherlands
POL	Poland
ROM	Romania
SCO	Scotland
SWE	Sweden
USA	United States of America

Appendix E

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